In This Issue: Electricity as an Adjunct in Increasing Port Facilities

JOURNAL OF ELECTRICITY

VOL. 42 NO. 7 SAN FRANCISCO, APRIL 1, 1919 PER COPY, 25 CENTS

Turn to the middle of your Saturday Evening Post, May 3rd,

and you will find a mighty striking Hotpoint announcement.

Then put the Post in your window. What more compelling window ad could you have?

This picture

is a little section out of the May 3rd Saturday Evening Post ad.

We are trying to educate the women of the country to buy percolators that are protected by this automatic switch which anyone can reset in a jiffy.

Have your sales force demonstrate this switch whenever they show Hotpoint Percolators

The profit you make from the merchandising of household appliances depends primarily on your turnover.

How many times did you turn your hollow-ware stock last year?

Whatever the answer, you can increase your turnover this year with

Hotpoint Tableware

For instance: Look at that line of percolators — every one equipped with the famous Hotpoint percolating device — no valves, floats or traps; every one equipped with the famous Hotpoint safety switch — if it over-heats, simply reset it.

No. 20611	No. 20652	No. 20620
This is our 6-cup aluminum percolator with solid cast aluminum spout. $10.00. Same design in nickel, $11.50	9-cup Grecian Urn with paneled sides. $21.50 Same design unpaneled, $18.50	5-cup nickeled percolating pot. $11.50. Same pattern 6-cup paneled sides, $13.50

With this line of hollow-ware you can take care of all the June weddings and other anniversary and gift occasions

Edison Electric Appliance Company, Inc.

CHICAGO

New York Ontario, Calif. Atlanta

Manufacturers of these four well known lines of household electrical appliances

HOTPOINT — GENERAL ELECTRIC — EDISON — HUGHES

THE old oaken bucket still clings to the well, but with the windmill it goes out of date as soon as the county can afford a regular system of water supply.

A dam and a reservoir are the economic answer to the water that goes over the fall.

When you wish to talk at long distance you wouldn't think of building your own individual telephone line.

In the electrical industry it's one man's business to make the goods, and another's to distribute them.

This system has resulted from the nature of the business.

The manufacturer can serve his customers best by utilizing the perfected system of distribution that obtains with Jobber representation.

The buyer gains, because this service has been built up in his interest and its evolution is based upon his requirements.

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ELECTRICAL SUPPLY JOBBERS ASSOCIATION
OFFICE OF THE SECRETARY
411 So. CLINTON ST., CHICAGO.

JOURNAL OF ELECTRICITY

FOUNDED 1887

ROBERT SIBLEY, Editor — CLOTILDE GRUNSKY, Associate

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The New Method Electrical in the West—

The changed position of the United States in the business world demonstrates most conclusively the vast importance of foreign trade and the possibility of its expansion. This country is now a creditor instead of a debtor nation. During the past year the United States did an export business of over six billion dollars as against an import business of three billion dollars. The month of January 1919, showed the largest exports of any single month in American history. The method electrical is beginning to play a vital part in dispatching and handling the vast traffic involved in Pacific Coast sea ports. Here is an electrical tractor with twelve trailers that instance how express traffic is handled through the great Ferry Building at the foot of Market Street in San Francisco, through which building it is estimated that more people pass daily than any other single building in the world, with the possible exception of the Union Depot in Paris. The ports of Los Angeles, Portland, Seattle, Tacoma and Vancouver, B. C., are taking their share of this prosperity as well.

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JOURNAL OF ELECTRICITY

DEVOTED TO THE UPBUILDING OF THE ELECTRICAL INDUSTRY IN THE WEST AND IN THE COUNTRIES BORDERING THE GREAT PACIFIC

Volume 42 SAN FRANCISCO, APRIL 1, 1919 Number 7

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YOU ARE NOT IN THE HABIT OF DENYING YOUR BILLS MERELY BECAUSE THE GOODS ARE IN YOUR POSSESSION. YOU HAVEN'T BEEN IN THE HABIT OF QUITTING THE JOB THE MINUTE YOUR EMPLOYER'S EYE WAS REMOVED. YOU DO NOT ASK FOR CHARITY. WELL, THEN — HOW ABOUT THE FIFTH LIBERTY LOAN?

The Licensing of Engineers

Crystallization of sentiment looking toward the licensing of engineers has taken place to a large degree throughout the West during recent weeks. Several legislatures have enactments under consideration and in some instances these have already passed the legislative bodies and received the signature of the respective governors.

Considered in its broadest aspects the movement toward the legalized certificate plan for the engineer seems to be inevitable and irresistible, because it is fast being recognized that the profession as a whole will be raised in dignity and influence under such legalization, and at the same time a certain sense of security or guarantee of service will be assured to the public at large. In several of the eastern commonwealths legislation has been made necessary due to the issue being forced from outside the profession. It is to be hoped that engineers of the West will anticipate such a contingency as this and arrive at such decisions that concerted and unified action may be possible. It is admitted that the entire subject of some broad certificate plan is, above all, the duty of the national joint engineering council to investigate and advise for concerted national action in so far as may be possible. But this in itself need not interfere with local action being taken at this period that may serve as a foundation for future growth and enlargement.

Although it seems advisable not to wait too long for action in the matter to be forced from without, nevertheless the unity of the engineering body seems more important even than prompt legislation, and the decision of the California engineers to defer action on their proposed bill until the next legislature when it may receive the unanimous support of the profession is to be commended.

In any case it may of course develop that initial measures which it may be possible to enact in the near future will prove inadequate, but the move is in the right direction. Time is now ripe for thoughtful consideration and unquestionably this whole matter will be one of the most urgent and engrossing to engage the attention of the profession as a whole during the next five year period.

The Passing of Senate Bill 570

In the last issue of the Journal of Electricity editorial comment was made upon the Master Electrician Bill, or what is commonly known as Senate Bill No. 570, recently withdrawn from consideration before the California Legislature. This is a matter of great current interest, since it has been up for proposed legislation in practically every legislature of this vast section of our country. In California its intensified discussion has brought about a great good, namely, all branches of the electrical industry have at last found themselves. They have found that free, open and aboveboard discussion is after all the one way to arrive at conclusions which go toward public betterment and increased service to the state.

It is to be said to the credit of the Industrial Accident Commission, too, that they frankly met the force of the conclusions brought out in this open forum discussion by withdrawing the proposed bill and proposing to await the conclusions of a representative committee of such composition as is detailed in the discussion of this matter appearing elsewhere in this issue.

No one can follow the broad policies of men of the electrical industry in the West without feeling a sense of inner pride in the fact that this industry is producing ideals and formulating ethical standards in contractor-dealer associations, jobbers and manufacturers' gatherings and central station activities that will primarily result in great good for the community served, at the same time, of course, adding to the material profit of those engaged in the work.

In regard to the matter at hand, namely, the formulating of helpful rules of electrical inspection and the granting of effective authority for supervision and administration of specific rules for public betterment and accident prevention in electrical matters, the Accident Commission will find in this great industry its strongest supporters and best advisers.

The One Man Car

The editorial on the one man car as a safety measure for electric railways which appeared in the Journal of Electricity March 1, 1919, has attracted nation-wide attention. It is interesting to note from the many letters of inquiry and commendation that have come in for editorial attention concerning this matter, that the one-man car is rapidly coming more and more into public attention and its use is being widely extended. The instance in Colorado is of particular interest. In this great commonwealth, the Colorado Springs and Interurban Railway Company, of Colorado Springs, has had one-man cars in operation on its side lines only since April 25, 1918. The company now proposes to install them on its two main lines and expects to have them in operation by April 1, 1919. As far back as 1908, when the first one-man cars were introduced upon the railways of the enterprising city of Missoula, Montana, under the direction of S. R. Inch, then manager of this system but now general manager of the Utah Power & Light Company, this system of installation has been growing in importance in the West, because it has thoroughly established a field of safe and economic usefulness in cities ranging up to 50,000 to 75,000 inhabitants.

The West Leads World in Power Development

In the issue of the Journal of Electricity for October 15, 1918, editorial comment was made giving detailed statistics showing that the Pacific and Mountain States, with but 6.7% of the population of the United States, consume fully 25% of the electric energy generated by the other 93% of the population of the United States, or $9.67 per capita as against $4.40 per capita for the rest of the country—nearly four times greater intensive use. It was also shown that in face of this present intensive development there is still undeveloped in this district twice the amount of undeveloped water power existent in the entire remainder of the nation.

This statement has created wide interest and has called forth much favorable comment in many leading magazines and periodicals. It is interesting to follow the preliminary returns of the forthcoming quinquennial report of the Bureau of Census at Washington on the central electric light and power stations of the nation. While all of these have as yet not been made public, the reports for the states west of the Rockies are now available and all of the largest electric power consuming commonwealths of the East. In comparing intensified electrical development in the West with even the largest power consuming commonwealths of the nation—New York, Illinois, Massachusetts—even such comparisons as these show how far western enterprise has outdistanced the East in matters electrical. By taking the 1910 census of population as a comparison, for instance, the per capita consumption in the three great commonwealths above noted is 378 kw-hr. per person per year, while the nine Pacific and Mountain States have a per capita consumption of 820 kw-hr. per person per year. Montana leads in electric power consumption with 2570 kw-hr. per person per year, with Utah second at 1250 and California third with 1150. There are no states east or west, nor indeed in the world at large, that can show such magnificent utilization of the method electrical as these commonwealths of the West. And this is only the beginning. The people who inhabit this region partake of an enthusiasm and a newness of life fully in accord with the spirit of daring and initiative that is even now formulating a vision of the usefulness of the electrical way in the home, upon the farm, and amid industry and transportation, that will within the next decade far outdistance any achievements hitherto in the method electrical and the utilization of vast natural power resources with which this district is blessed.

The New Advance in Salesmanship

It is now beginning to be recognized more and more that the true function of salesmanship is to study the needs of the customer and to sell to him an article of merit that will bring to the purchaser the service for which he pays, and at the same time create a service remuneration to the salesman. In other words, any transaction in which money is paid for something in which value received is not on an equal footing does not constitute a sale. Nor does a transaction in which an article of merit is sold, thus rendering a service, constitute a sale, if the one selling the goods does not receive for it a sum of money that will net a profit to him in value commensurate with the service rendered. Salesmanship, then, may be defined as the act embodied in being able to sense the needs for service and then to supply that service at a compensation in proportion to the service rendered.

One great authority has well said that the super-salesman is a man true to the interests of his customer, and whose supreme purpose is to quicken the imagination of his customer and make the customer see the true virtues of the goods the salesman is selling. Such a salesman foresees the needs of his customers and provides against those needs in full faith that the event will justify his foresight. Indeed such a salesman puts his ideals above his profits, in full confidence that profits accrue to fine ideals intelligently executed.

Those of us who follow closely the trend of the hour cannot help but feel that ideals of salesmanship which are being formulated and put into actual practice in the electrical industry and closely allied engineering activities in the West constitute perhaps today the most remarkable advances in world ethics anywhere recorded.

And in the practical application of these ethical standards published in detail on page 400 of the Journal of Electricity, Nov. 1, 1918, as formulated by the California Electrical Cooperative Campaign, is today asserting itself. While on the one hand we find, for instance, Chas. C. Parlin of the Curtis Publishing Company, at a recent California Electrical Cooperative Campaign dinner, driving home the fact

that national advertising can prove vastly more effectual by the salesman cooperating with and tying-in with national effort, on the other hand we hear at the same gathering C. N. Banta, of the Wells Fargo Nevada National Bank forcefully depicting how cooperation in the truest and highest sense of the word aids in raising the standards of credits, collections and finance.

Hence it is that the modern salesman, bearing in mind these new ideals of cooperative effort and equipped with those spiritual qualities—intentness of purpose, concentration of effort, enthusiasm, initiative, and confidence—may well be said to be preparing for service ahead in the West that will overtop the narrow bounds of a single industry, and we shall not be surprised to find the next decade in the West produce men that will become leaders of thought in the evolution of industry and affairs of state in the years immediately ahead.

The Airplane in Business

Will tomorrow's rush orders be delivered by aeroplane? Will that means of transportation shorten the time of the necessary business trip and revolutionize the methods of spectacular advertising? That the aeroplane is to become a permanent factor of our life, no one who is familiar with the progress of the art during the war can question. Aside from the enormous strides taken in the perfection of the machine itself, the mere fact that thousands of young men are today proficient in handling aeroplanes would tend to hasten their adoption into many fields of business enterprise.

It is interesting to note that an aeroplane has been adopted by the western division of the Canadian forest service as the most efficient method of locating and reporting forest fires. A large sheep rancher in the north is making use of an aeroplane to locate lost bands of sheep who have strayed off into the mountains. A recent notice tells of the transportation of a washing machine by an aeroplane near Chicago which received wide publicity—an example of its advertising use. During the war a rush order for electrical supplies for the government which could not be delivered by an eastern factory in the required time was called for by an aeroplane from the nearby training school and satisfactorily delivered. The aerial mail service is still more of a curiosity than a business asset, but improvements are coming very fast.

These are but hints of the possible future applications. A committee, of which Viscount Northcliffe was chairman, appointed by the British Government to investigate the extent to which it would be possible to utilize in civil life the trained personnel and aircraft of the military air services, recently reported that the carriage in aircraft of mails, passengers and goods will present no difficulty from the technical point of view. They further pointed out the following special fields where the aeroplane was adaptable:

1. In the case of mails, by competing with telegraph services or in establishing a new type of express letter service.
2. In the case of passengers, by competing with rail, marine, and road services over long distances, or where the journey either includes sea as well as land passages, or is between places not conveniently served by rail.
3. In the case of goods, by enabling ordinary merchandise, commercial samples, and even (if necessary) spare parts of machinery urgently required, to be conveyed quickly to places otherwise inaccessible except by journeys involving great expenditure of time.

The popular belief in the high mortality of those who trust themselves to the air will have to be overcome before any passenger service can be practically established, but this is only a matter of time. With the hazards of war and of the trick flying necessary to dodge bullets and outwit the enemy removed, the safety factor is greatly raised. Although, of course, the possible improvements are unlimited, the machine today presents all necessary factors for practical use. The frame of the aeroplane is much stronger than popularly believed and sufficient to stand ordinary strains for long periods, a stabilizer has been invented which permits the machine to maintain its equilibrium even in case of accident to the pilot, and the art of flying is so much better understood that in most cases it is possible to land safely even in the case of failure of the engine. The greatest problem as yet unsolved is that of landing—a possible solution for which is suggested in the timely article by C. B. Merrick which appears elsewhere in this issue.

But if the general use of air transportation for passengers and freight is yet to be developed, the aeroplane for advertising stunts and feature purposes is here today. Not only does electricity play an important part in the training of aviators, in the radio telephone and other instruments which broaden the field of application, and in the night marking of landing places and danger signals, but this progressive industry will undoubtedly be one of the first to make practical use of the new field.

THE NEW JOURNAL SERVICE: The great convention issue of the Journal of Electricity will appear April 15, 1919. This issue has received such cordial support from all quarters that both from an advertising and a reading viewpoint all previous efforts of the Journal of Electricity will be eclipsed. The convention papers, covering the matters to be discussed at the Coronado Convention, April 30-May 2, 1919, are of exceptionally high order and will prove to be of great timely value. The advertisers who have so liberally supported this effort of the Journal of Electricity will display new ideas in electrical design and installation well worthy of the most thoughtful consideration and hearty support of all our readers.

With this issue of the Journal of Electricity are inaugurated the Library series by Miss Krause, librarian of H. M. Byllesby & Company, and the educational series on practical lessons in electricity, under the direction of the Extension Division of the University of California and the University of Oregon. Both these series have already attracted nation-wide attention and it is believed this interest will be later found fully warranted.

All copies of the various issues of the Journal of Electricity since the first of the year have been completely exhausted and as there is a great call for extra copies, face value will be paid for receipt of any and all copies of this period sent into the office of the Journal of Electricity.

PORT FACILITIES AND FREIGHT HANDLING

(Plans for improving San Francisco harbor to meet the expanding commerce of peace times include an increase in efficiency through the adoption of mechanical freight handling facilities. The argument for these conveniences and the rough outline of a possible plan of procedure are given in the following extracts from a report prepared for the San Francisco Chamber of Commerce by Miles Standish, now with the State Harbor Commission, and F. E. Boyd, manager of the small motor department of the General Electric Company, San Francisco. —The Editor.)

The Public—The docks, railway, spur tracks, and drayage areas constitute essentials of the port of San Francisco. But mechanical equipment for handling freight is as much of an essential to a modern port as the harness is to the proper utilization of a horse and wagon.

The time has passed when a pier can be considered as a separate unit. It is a part of the terminal installation, and in order to get the greatest returns out of the money invested, the pier must be equipped with mechanical freight handling appliances, which mean:

Increased capacity of terminal due to increased speed in handling freight.

Decreased overhead charges per ton due to increased tonnage handled at a relatively small increase in investment.

Greater pier capacity per unit of floor area brought about by the fact that with machinery it is practical to tier 15 to 25 feet, as against 5 feet by hand. This alone triples a pier's capacity.

The Steamship Companies—It is not uncommon to find 50 to 75 drays and automobile trucks lined

LOADING LARGE CRATES ON MOTOR TRUCKS

Expedition in loading trucks means money saved for the transfer and for the steamship company and hence, ultimately, for the consumer.

up on and outside of a pier waiting to dispose of or receive a load. This represents idle investment and unnecessary overhead charges. It also means congestion in drayage areas and at the entrances and exits of the docks, all of which is expensive.

The Merchant and the Consumer.—The employment of mechanical freight handling machinery means to the merchant quicker deliveries and uniformly regular deliveries, all of which means greater "turn-overs" and increased earning power of his capital.

The employment of this machinery means to the consumer a reduction in the cost of living, as is illustrated by the following facts:

Recent investigations made by the Interstate Commerce Commission into the subject of water borne freight show that the cost of carriage of freight on the water is 40% of the total, whereas the cost of handling the freight at the terminals is 60% of the total. This is particularly true of coast-wise shipping. When boats can make more trips per year to San Francisco the rates to this port will be better and again the consumer will benefit, to say nothing of all the benefits directly or indirectly resulting from the ideas which have preceded.

A MECHANICAL CONVEYOR AND PILER

The bags of sugar in this factory at Oxnard, California, are carried to position and stacked with one continuous process. These conveyors are especially useful in transferring bulky material to and from the holds of ships.

Labor.—The employment of mechanical freight handling appliances will increase capacity for business and the activities of the community will be in proportion. Labor as a whole will be better. Witness the automobile industry which has reached its present enormous size primarily as a result of the so-called labor saving machinery employed. Labor only need look at the greatly increased demand for workers in this industry to appreciate the real advantages to it of the employment of mechanical appliances and automatic machinery.

Competition.—The cost of transportation from the place of origin to the place of consumption gen-

erally limits the area within which business can be done. A decrease in transportation expense not only facilitates commerce, but creates commerce and manufacture.

Transportation efficiency is being recognized as principally a terminal problem. No transportation can be more efficient than the terminal facilities permit it to be.

The following tables have been developed by the Electric Vehicle Association of America, based on figures given by Mr. W. J. Wilgus, late vice-president of the New York Central Railroad.

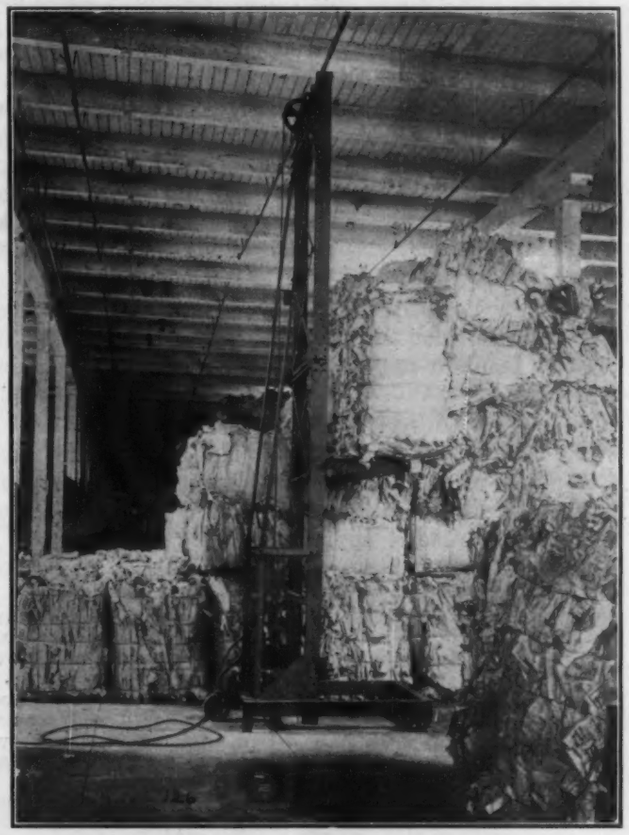
As a concrete example, we will suppose that a manufacturer in Philadelphia sends one ton of freight to a merchant in New York City. From the time the freight leaves the manufacturer the Philadelphia charges are as follows:

Labor cost of loading on a wagon	$ .25
Unloading of freight station	.50
Cost to railroad in billing and other clerical work	.40
Actual operating expense of loading and switching freight car, etc.	.25
	$1.40

The cost of handling in New York is as follows:

Terminal costs on New Jersey side of North River (average of all railroads)	$ .15
Lighterage	.80
Terminal cost on water front of Manhattan Island	.50
Cartage expenses in New York City	.80
	$2.25

The terminal charges at both ends equal a total of $3.65 on one ton of freight. It costs the railway to haul freight 3 mills per ton mile, or for the 90 miles between Philadelphia and New York it costs 27c per ton. The cost of getting a ton of freight started on its journey at one end and handling it from the Jersey City terminal to the consignee's store at the other end is nearly 14 times as much as the cost to haul the goods all the way from Philadelphia to New York. To haul a ton of freight 1000 miles from New York to Chicago costs $3.00, or 60c less than the terminal charges at both ends. In other words, it costs more to load a barrel into a car at Chicago and to unload it at New York than it does to move the same barrel between the two cities on the railroad.



STACKING BALED PAPER BY MACHINERY

It is more economical to tier 20 to 25 feet with mechanical devices than 5 ft. by hand. This is but one method of doubling the value of wharf space by utilizing it more intensively.

Methods of Improvement

A Comprehensive Plan.—Although this report deals entirely with the problem of handling freight, it is important to recognize that in working out this problem due consideration must be given to other essentials of our water front. The plan of a port should not only include an arrangement of docks, belt line railway, spur tracks, drayage areas, and a system for handling freight, but should also give consideration to the proper location of freight yards, warehouses, and to the encouragement of the establishment of factories and factory lofts in the section of the community conducive to efficient movement of raw and finished material.

A Special Plan.—A special plan providing for a general scheme of handling freight should be worked out with the idea in view of keeping the freight on wheels and preventing congestion. This scheme should develop a logical method of transferring freight from and between barges, river boats, ocean going vessels, cars, docks, drays, warehouses and factories.

Working Present Equipment. — Our present scheme of developing the water front seems to be tending towards building more docks. This results in an expansion of the area over which the freight is handled. Development in this direction is in accordance with good practice up to a certain point, beyond which it is better to provide improvements for being able to handle increased volume of business in a restricted area. The price of a new pier or two would pay for an immense amount of freight handling machinery, which instead of increasing our facilities by the capacity of one or two new piers, would increase the capacity of all our present piers two or three times.

Every calculating engineer and business man will quickly appreciate the value of planning in this direction, as long as we do not carry the development beyond a point where undue congestion might be encountered.

Standardizing Methods.—In so far as possible, the scheme of handling freight should be worked out with a view of providing a similarity of methods on as many docks as is possible.

A definite plan and place for receiving and shipping goods should be provided. This is particularly applicable to goods which are drayed. Platforms on the shore end of piers are good and eliminate a great deal of confusion and congestion on the docks. With these platforms properly connected, by mechanical freight handling appliances, with the tiering spaces on the docks, the drays can be kept off the dock almost entirely.

The docks should be wired for electricity so as to supply not only current for lighting, but similar current for power purposes, in order that power-driven appliances may be used at all points on any dock or can be transferred from one dock to another, as occasion may demand.

With the employment of large numbers of terminal freight handling battery trucks, it might not be amiss to provide at suitable points battery charging stations for the trucks.

Similarity in methods on all docks would also have the advantage of causing the stevedores to be more efficient, as they will perform their work with less confusion and the draymen will carry out their functions with greater dispatch.

Modernizing the Superstructure.—The character of construction of the sheds is particularly important, as it has a great deal of effect upon the capacity of the port. The ceilings or overhead rafters should be sufficiently strong and high above the floor to permit the use of overhead machinery. The supporting columns must be so proportioned as to withstand the strains resulting from the employment of overhead appliances, and also strong enough to permit the employment of gantry cranes along the dock edge.

AN ELECTRIC LOADER

The prompt clearing of the dock space is what makes it possible to increase the service of the pier and expedite shipping. Nothing is more important in lessening this time factor than mechanical devices for handling freight.

At docks where passengers are liable to be received, it is advisable to provide overhead gangways.

Modern practice in shed construction is in the direction of two-story buildings. This arrangement is susceptible of a more satisfactory scheme of receiving and shipping freight. Goods being unloaded from the boats can be deposited upon the second floor and discharged into trucks and cars, located on the first floor, by means of chutes and other efficient freight handling appliances. It is also possible to so design the second story of the shed that it can project over the street entrance to the pier, thereby permitting of the loading of drays without their having to go onto the pier.

Night Deliveries.—It is interesting to note that in the East the suggestion has been advanced that night deliveries by drays could be employed to eliminate congestion at our big ports; the idea being connected up with the fact that our railways run day and night and their capacity would be very much limited if they ran only during the day, to say nothing of the great congestion which would take place at their terminals.

What Others Are Doing

The City of Portland has equipped its municipal dock with portable electric winches to help and to speed up the loading and the unloading of boats. The city has provided four electric terminal freight handling storage battery trucks and equipment at one end of the docks for charging the batteries. At the present moment Portland is receiving bids on a very large grain elevator, this including some 1500 electrical horsepower, to facilitate the rapid and efficient handling of the cargo.

At Seattle, the port commission has provided the Smith Cove Terminal with a gantry crane, a shear-leg hoist, terminal freight handling storage battery trucks and tractors, and motor driven conveyors. The privately owned docks at Seattle are equipped with terminal freight handling storage battery trucks.

New Orleans has given its problems serious consideration and has equipped its water front with motor driven conveyors and other machinery. It is interesting to note that New Orleans has found it advisable and profitable to install mechanical freight handling equipment in the face of the fact that they have so-called cheap negro labor.

Likewise in Germany, the Port of Hamburg long before the war was notably well equipped with powerful cranes and mechanical appliances generally, although they, like New Orleans, had at hand labor much cheaper than that available at our Pacific Coast ports.

Boston was provided by the commonwealth of Massachusetts, under the supervision of the Directors of the Port of Boston, with a four-million dollar pier called the Commonwealth Pier, which is equipped with a great system of cargo hoists and other machinery. Although it is reported that this great dock has not proved all its designers expected, it has emphasized to the authorities at Boston the importance and the bigness of the problem confronting them and they are now studying their situation with a view of providing more capable means to take care of the business which centers in their community.

New York for a number of years has been more or less continuously studying and developing its water front in connection with the freight handling problem.

Saving by Machinery

The savings brought about by the employment of many of the appliances is largely apparent, but the following points should be emphasized, as they are not so readily appreciated:

By use of overhead appliances valuable floor space is made available for sorting and tiering.

When an overhead adjustable loop system is used, great flexibility is attainable and high tiering is made easy, thereby doubling or tripling the capacity of a given pier.

An argument in favor of dock cranes is that power from the engine room is not always required, and in many cases the fire may be drawn, effecting a saving therefore to the ship owner and producing an added attraction to the port.

It is also possible with electrically operated dock cranes to use a portable controller, making it possible for the operator to see the load being handled from the bottom of the hold until it is laid on the pier. This method of control is also conducive of less damaged goods and breakage.

In connection with the many forms of power-driven conveyors for tiering purposes, it should be pointed out that it is more economical to tier 20 to 25 feet with these devices than it is to tier by hand 5 feet. Furthermore, it is not to be overlooked that it is cheaper to hand truck 400 feet on the dock than to tier by hand 5 ft.

Although there are so many obvious advantages and savings in using electrically driven machinery and trucks, there are but a very limited number of reasons for using the old two-wheeled hand trucks

THE STORAGE BATTERY TRUCK

The electric truck is the one mechanical freight handling convenience which may be said to be in general use. Its advantages are so obvious that the burden of proof now rests with the users of hand trucks.

when we consider the great advantages of the hand operated transveyors.

When all is said and done, the present hand methods employed in handling freight are so indefensible, considering modern appliances at hand and the relatively small investment associated with them, it is remarkable that we have continued with the antiquated hand methods so long. There really should be no necessity of arguing for the employment of mechanical freight handling appliances. The proof should be the reverse, as it were, and one should be asked to prove why they should continue to employ the present hand methods.

FUSE SIZES FOR INDUSTRIAL MOTORS

The proper size of fuse for a motor is only too often obtained by the chief electrician or one of his repairmen by haphazard methods. The motor's normal operating current is given by the maker on the name-plate, but fuses are properly selected of a larger capacity for starting and for momentary overloads. Hence it is rather more usual for the maintenance man to select his fuses "be guess and be gosh," with a view to their permanence in service rather than the safety of the motor they are supposed to protect.

Since the fuses for squirrel-cage and repulsion motors without rheostats are, respectively, rated at 3 and 4 times full-load current, they give practically no overload protection. Hence it is recommended that double-throw switches be installed connecting the motor through fuses of 1.5 times full-load rating (as underwound rotor sizes) for running and through the regular heavier fuses or direct to the line for starting.

In order to give a practical working idea of what sizes to use, the Westinghouse Electric & Manufacturing Company has prepared the accompanying tables. . These are based on the following assumptions as to size of fuse required to stand starting current without blowing:

Type	Times Fuse Load Current at Starting
Polyphase Wound Rotor	1¼
Squirrel Cage (thrown on line)	3
Single-Phase Repulsion Induction—With Rheostat	2
Single-Phase Repulsion Induction—Without Rheostat	4
Direct Current	1¼

DIRECT CURRENT MOTORS

H.P.	115	230	550
1	10	5	3
1½	15	8	3
2	20	10	5
2½	25	12	6
2½	30	15	6
3	30	15	6
3½	35	15	6
5	50	25	10
6½	65	35	15
7½	70	35	15
8½	85	45	20
10	90	45	20
11	100	55	25
12½	110	60	25
15	125	70	30
20	175	90	35
25	225	110	45
30	275	125	55
35	325	150	65
40	350	175	75
50	450	225	95
60	550		110
75			150
100			200

3-PHASE WOUND ROTOR INDUCTION MOTORS

H. P.	Fuse Rating (Amp.) When Voltage Is 220	440	550
5	20	10	8
7½	30	15	12
10	40	20	15
15	50	25	20
20	70	35	30
25	85	40	35
30	100	50	40
35	125	60	50
40	150	70	60
50	175	80	65

2-PHASE WOUND ROTOR INDUCTION MOTORS

H.P.	Fuse Rating (Amp.) When Voltage Is 220	440
5	20	8
7½	25	15
10	35	20
15	45	25
20	60	30
25	70	35
30	90	45
35	110	55
40	120	60
50	150	70

3-PHASE SQUIRREL CAGE MOTORS

H. P.	Fuse Rating (Amp.) When Voltage Is 110	220	440	550
½	12	6	3	2
1	20	10	5	4
2	35	20	10	8
3	50	30	15	12
5	90	45	25	20

2-PHASE SQUIRREL CAGE MOTORS

H. P.	Fuse Rating (Amp.) When Voltage Is 110	220	440
½	10	6	3
1	20	10	5
2	35	15	10
3	45	25	15
5	80	40	20

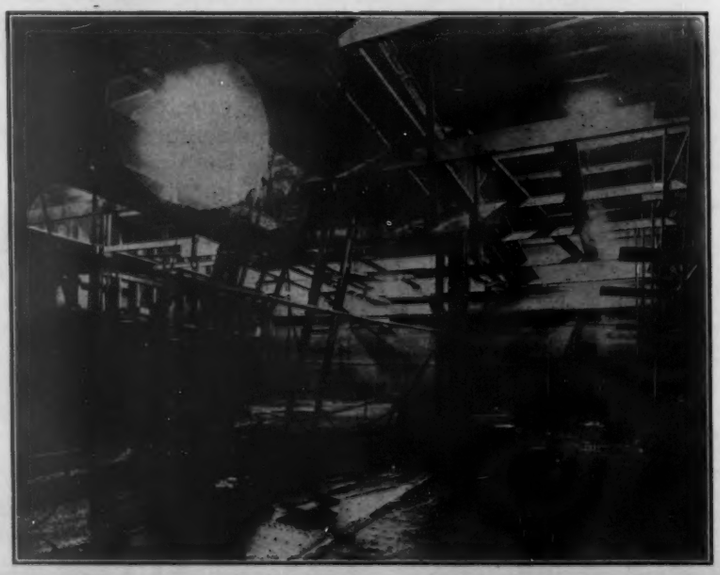
TYPE AR SINGLE PHASE MOTORS

H.P.	Without Rheostat 110	220	With Rheostat 110	220
2	80	40	40	20
3	120	60	60	30
5	200	100	100	55
7½	325	175	175	80
10	400	200	200	100
½	20	10	10	6
¾	30	15	15	8
1	40	20	20	10

PORTLAND SHIP YARD ILLUMINATION

General night illumination of four hulls. The overhead illumination is furnished by 50–1000 watt units in Benjamin reflectors on goose necks which can be raised and lowered twenty feet. They are wired one circuit per lamp. The midway illumination is produced by 72–500 watt, 540–2X Benjamin reflectors with special deep guards. They are fastened to staging forty feet from the ground and are wired 2 lamps per circuit. The lower level illumination is produced by 259–60 wall lamps. Temporary lights are provided under the hulls — 60–500 watt lamps in 5402 Benjamin reflectors with extra deep guards. There are 14–1000 watt No. 90 X-ray floodlights. The total load amounts to 1600 amperes carried on a 3-wire 110 volt circuit. The cost amounts to $20,000, exclusive of units.

Night work must be done in the office as well as in the yards and adequate illumination must be furnished. This is the office of the Northwest Steel Company of Portland. The room is 50 by 30 ft. and is illuminated by M. J. Walsh & Company's Perfection Semi-indirect units furnished with 10–300 watt lamps. The ceiling, which is 11 ft. high, is painted white. The walls are of oiled and varnished natural fir.



Better illumination has been one of the main factors in cutting the time of construction from eight months to sixty days for the work on the hull. In both cases two-hour shifts were employed. There used to be a great deal of loafing on the night shift—now quite the opposite. This picture represents hold No. 2 of an 8800 ton steel ship under construction by the Northwest Steel Company of Portland, Ore. The illumination is produced by 7–300 watt lamps.

PRACTICAL LESSONS IN ELECTRICITY

BY H. H. BLISS

(This is the first of a series of fifteen papers upon the fundamentals of electric circuits and machines. The series forms the backbone of a correspondence course in Electricity which is administered jointly by the University Extension Divisions of the Universities of California and Oregon. Full information in regard to the course will be gladly furnished upon application to the Journal of Electricity or to either of the universities mentioned. Professor Bliss, who has charge of the technical extension instruction for the University of California, is the author both of the Journal discussions and of the correspondence course.—The Editor.)

OHM'S LAW AND THE ELECTRIC CIRCUIT

Our discussion of the electrical principles and practice begins with the consideration of Ohm's Law, which is the basis of all quantitative knowledge of circuits and machines. Its fundamental character is recognized in the industry, and the National Electric Light Association has adopted for its official emblem the Ohm's Law formula "C = E/R," which appears upon all the stationery and official documents of this nation-wide organization.

Electric Currents.—In order to utilize electric energy it is necessary to connect the source of the current, such as a battery or generator, to other apparatus, such as motors, heaters, or lamps. There must be a continuous path for the current from the source to the point of use and back again to the source. As soon as this circuit is broken at any point the current stops.

The materials which can carry electricity are called "conductors." They include all metals, both

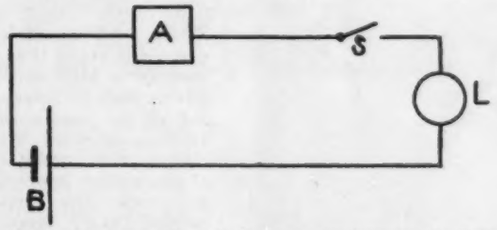
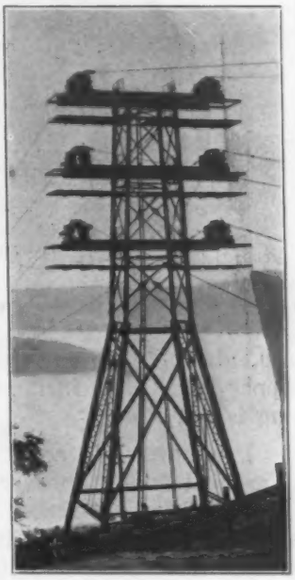


Fig. 1.—The current goes through the ammeter between the battery and the lamp. When the switch (S) is opened the battery (B) can no longer send current to the lamp and the ammeter needle points to the zero mark.

when solid and liquified (as mercury or melted iron); carbon; impure water; earth; moist woods, etc. Materials which stop the flow of electricity more or less completely are termed "insulators." These include glass, porcelain, marble, slate, rubber, paper, cloth, wax, dry wood, etc. The fact that any water, except chemically pure distilled water, can carry electricity causes such materials as wood, cloth, paper, dirt, etc., to fall into one class or the other according to whether they are dry or wet. And small particles or veins of metal in insulating materials sometimes lead the current to places where it is a source of annoyance or danger. Air is generally an insulator, but under certain circumstances it becomes a conductor, as, for example, in the electric arc where large currents flow for a short distance through air.

Measuring Electric Current.—A current of water in a pipe or a river can be metered in various ways, and the rate of flow can be stated in terms of gallons per second. In a similar way the rate of flow of an electric current can be stated as so many "coulombs per second," but it is more customary to substitute for this phrase the single word "amperes." A statement that "the current is 16 amperes" means that 16 coulombs pass a given point in the wire every second.



Here is a typical example of the use of insulators and conductors in long distance transmission of electric power. The famous crossing of the lines of the Pacific Gas & Electric Company, at Carquinez Straits in California, was for years the most daring enterprise of its kind and today it ranks as the second longest span in the world. Each of the six cables consists of 19 strands of steel wire, making a composite size for each cable of ⅞-inch diameter, with the remarkable length of 6200 ft. Assuming that a cable 6200 ft. long, equivalent to No. 1 copper wire, has a resistance of 0.77 ohms and a carrying capacity of 150 amperes, what is the voltage required to force the current through this resistance, according to Oohm's Law?

Tungsten lamps take currents ranging from .23 to .91 amperes in the sizes commonly used (25 to 100 watts); arc lamps take from 3 to 20 amperes; a 10 horsepower motor on a 250 volt circuit will take about 40 amperes.

To measure the rate of flow in an electric circuit we use an instrument called an "ampere meter" or "ammeter." It is inserted into the circuit, as shown in Fig. 1, so that the current must go **through** the instrument between the source and the load. A needle shaped pointer moving over a scale gives a reading of the current in amperes.

Resistance.—If in the circuit of Fig. 1 we replace the lamp by one of different candle power or by a piece of fine iron wire or by an electric bell, we shall find the ammeter giving an entirely different reading. The battery tries equally hard to force electricity through the circuit, but the amount it can send depends upon the apparatus through which the current must flow. We may say that the lamps

differ in the amount of **"resistance"** they offer to the passage of electricity. If one takes three times as many amperes as a second, we may say that it has one-third the resistance of the second.

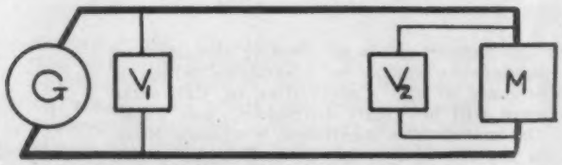
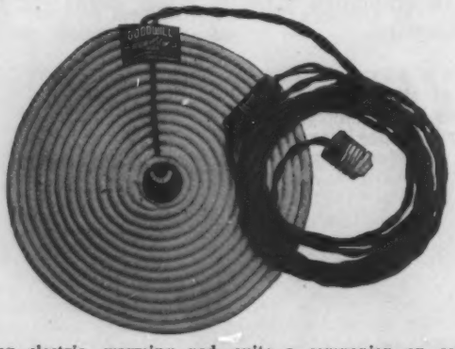


Fig. 2.—Voltmeter V_1 measures the electromotive force of the generator; V_2 measures the pressure applied to the motor.

Electrical resistance is measured in "ohms." It is thought of as a sort of "electrical friction," like the opposition a rough pipe offers to the flow of water through it. The resistance of a 25 watt Tungsten lamp is about 485 ohms; that of an electric



Here is an electric warming pad—quite a companion on cold nights. Attached to a 110 volt circuit it takes a current of one-half an ampere. What is its resistance?

iron, about 25 ohms; the resistance of a piece of copper wire 1/10 inch in diameter and 1000 feet long is one ohm.

Pressure.—We come now to the consideration of a third factor in electric circuits, namely, the **"pressure"** which forces the current through the wires. There is evidently something in a battery or an electric generator which forces electricity to go out at one terminal and to come back at the other, just as a pump sends water out at one place and draws it in at another. Of course, an open switch or a closed valve may block the flow, but the electric pressure or water pressure is still ready to start the current when opportunity is offered.

Water pressure is measured in pounds per square inch, by means of a pressure gage. The unit of electrical pressure is the "volt." The pressure or "voltage" in ordinary house circuits is about 110 volts; a dry battery has a pressure of about 1.5 volts; the voltage applied to street car motors is usually about 550.

There should be no confusion about the words **ampere** and **volt.** The number of **amperes** indicates the **rate of flow,** without reference to the pressure driving the current. Then "110 volts" indicates only a tendency to send current with no reference to how much, if any, actually flows. We may have 110 volts and 1, 5, or 500 amperes, or no flow at all, depending upon the resistance in the circuit.

To measure pressure we use a **"voltmeter,"** an instrument which somewhat resembles an ammeter. To find what voltage is sending (or available to send) current through a circuit or piece of apparatus, we connect one terminal of the voltmeter to each end of the circuit or to each terminal of the appa-

A current of gas may be measured in cubic feet per minute, by means of this meter and a watch; an electric current is more easily measured, in "coulombs per second" or "amperes," by means of a single instrument, the ammeter. The current in either case must go through the meter. (See Fig. 1.,

ratus. In Fig. 2 the voltmeter marked "V_2" measures the "voltage across the motor" (the pressure tending to send current through the motor), while the other voltmeter measures the pressure the generator exerts to send current through the whole circuit. The two instruments need not give equal readings.

Ohm's Law.—One volt is the pressure needed to send one ampere through one ohm resistance. From this it follows that the number of volts required to send a current through any resistance is equal to the product of the numbers of amperes and ohms. This statement, which is known as Ohm's Law, may

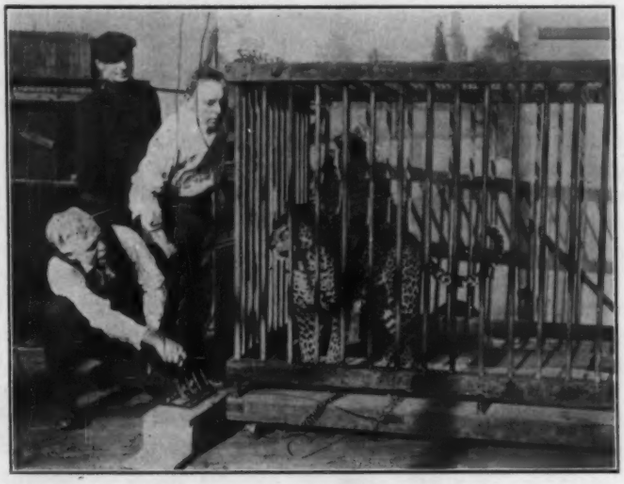
When this switch is opened it stops the current in a high tension power line by interposing an air resistance of millions of ohms. When closed, the resistance of the switch is practically zero. The current carried may amount to 300 amperes. To prevent the escape of current, under the enormous pressure of 110,000 volts, the switch has to be supported upon these huge insulators. Switches of this type are to be used in connection with the Chicago, Milwaukee & Puget Sound—the first electric transcontinental railway.

be indicated by a brief formula: "Volts = amperes × ohms." Other ways of writing it are: "Amperes = volts ÷ ohms" and "Ohms = volts ÷ amperes." All three formulas should be memorized.

The second of the three formulas may be written: "Current = electromotive force ÷ resistance." Using initials instead of words, C = E ÷ R. This is the symbolic representation of the law as used in the emblem of the N. E. L. A. shown at the head of the article.

Western Ideas

A NEW USE FOR ELECTRICITY was discovered by one moving picture company of Southern California. Moving picture companies are always finding new uses for electricity, which plays a most important part in their business from lighting the scene of action to developing the films—but this was a slightly different affair.



Throwing th switch which electrocuted the leopard. The pictures are copyrighted by the Keystone View Company.

The big leopard used by the E & R Jungle Film company had been sentenced to die and in order to save his very beautiful pelt, it was decided to electrocute him. According to Mr. Edwards, manager of the company, most of the animals used in film work are very tame but David had been acting treacherously for several months, and rather than risk the injury of any one who might be acting with him, it was decided to end his career.

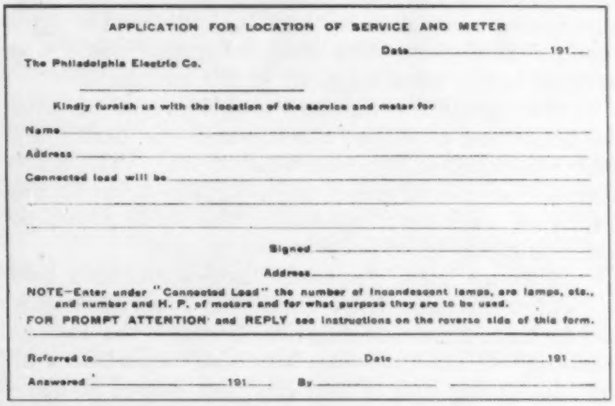
At first, shooting with a high powered rifle was considered but fearing that this would disfigure the

A steel plate was placed on the bottom of the cage and connected to a 6000 volt power line. In this way the pelt was secured unblemished for further use in the moving pictures.

beautiful pelt which they wished to preserve, the engineer of a large electric power station near by was consulted and electrocution was decided upon.

A large steel plate was placed on the floor of the cage and connected to a 6000 volt power line at the power house. David was then placed on the plate and another wire fastened to his leg, the current turned on, and David was no more.

ONLY BY COOPERATION can the utility, the electrical contractor and the ultimate consumer be protected, whether the work in hand involves the wiring up of a building or the installing of a motor. The contractor who undertakes work in a building unfamiliar to him is often handicapped by not



APPLICATION FOR LOCATION OF SERVICE AND METER

Date ..... 191...

The Philadelphia Electric Co.

Kindly furnish us with the location of the service and meter for

Name .....

Address .....

Connected load will be .....

Signed .....

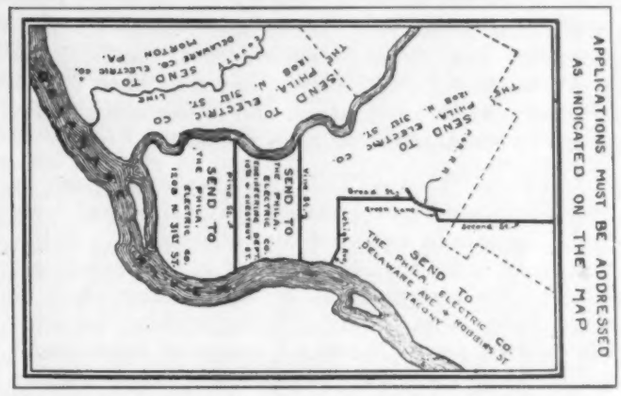
Address .....

NOTE—Enter under "Connected Load" the number of incandescent lamps, arc lamps, etc., and number and H. P. of motors and for what purpose they are to be used.

FOR PROMPT ATTENTION and REPLY see instructions on the reverse side of this form.

Referred to ..... Date ..... 191...

Answered ..... 191... By .....



The front and back of the form used by contractors who wish to secure information as to the location of meter and service. Note the convenient division into districts which is clearly explained by the map on the reverse side of the blank.

knowing the exact location of the meter and the point where service is to be delivered.

To supply good service both interior wiring and work on aerial or underground lines is necessary, and the Philadelphia Electric Company has provided a form to furnish data on the point at which service is to be delivered and the location of the meter. It was with the idea of avoiding any misunderstandings as well as to assist the contractor to submit definite figures on his work that the service location form here shown was prepared.

The form, as will be noted, is complete when all information is properly filled in, and therefore needs no discussion. Sufficient is it to state that each application is given prompt attention and, according to Ross B. Mateer, of the Philadelphia Company, its use has been very satisfactory.

ADVERTISING "SECONDS" so as not to divulge the fact that the goods are "seconds" may

sometimes bring a better crowd to a sale because of the seemingly low prices quoted, but such sales, in the long run, destroy confidence in advertising and do not pay, says a bulletin just issued by the Associated Advertising Clubs of the World.

An example mentioned by the Associated bulletin is that of a Michigan electrical goods dealer who advertised nitrogen lamps.

They were burnt out lamps which had been remade. They were plainly described as remade lamps on the label they bore, yet a customer of the store complained to the vigilance committee of the local advertising club that he had been defrauded. He thought they were new lamps, because there was nothing in the advertisement to the contrary.

The vigilance committee took the case up with the dealer and explained the necessity for describing such merchandise for just what it was. The management gladly refunded the purchase price to the displeased customer, agreeing, the same time, to describe goods more fully in the future.

In many lines, "seconds" are sometimes sold without mentioning their quality in advertisements, and to meet this, Los Angeles, through the instrumentality of the truth-in-advertising department of the advertising club of that city, has passed an ordinance providing a heavy penalty for failure to describe such goods fully in an advertisement. An incomplete description in such a case, the Los Angeles advertising club believes, is unfair both to the customer and to competitors, and is therefore detrimental to the best interests of business.

ATTRACTING ATTENTION is the first step in advertising—and every feature of the electrical dealer's business is in some measure advertising. If the store front is to provide its share in this campaign and take its real place as an advertising asset it should have some definite, distinguishing feature. This may be accomplished by means of fresh paint of a striking (but not garish) color, clean modern windows, exceptionally good window illumination, a novel sign, or even a better sidewalk than its neighbor's.

Change the window display often and make each display interesting. Make the store a bright spot at night—good illumination is a sales magnet.

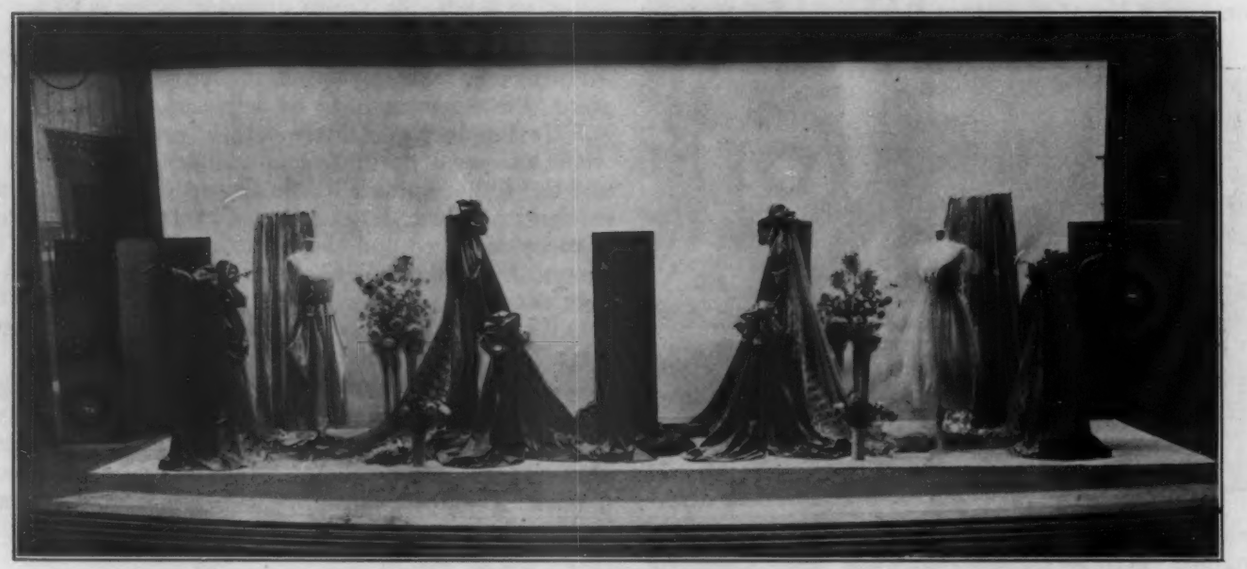
In other words, a store, to attract favorable attention, must stand out from its neighbors and say, "Here I am!" to every passer-by. It must offer in outward appearance and inside arrangement something to distinguish it from other similar establishments both in and out of its own surroundings. Just as a colorless person is never a success, either socially or in business, so your store must have its own personality on the basis of which it appeals for friends.

IN REGARD TO THE FOREIGN TRADE which the west coast of this country is picking up again as a peace time measure, a little booklet recently published by a printing firm handling foreign matter is of special interest. You will be advertising in Spanish, perhaps—or in Chinese. Well,—

"As a business man, you will agree that to do a successful business, it is above all necessary that you understand the buyer's needs. To understand the buyer's needs, you must understand the buyer.

"The best way to prove to him that you understand him, is to speak to him in precisely the same language he uses in his business. Bear in mind that this does not only mean the same **tongue** he uses, but the same **idioms**, the same technical or trade terms, the very words he uses in reselling the goods you want to sell him.

"The general impression prevails that any native of a given nationality will do, as a translator of business literature, so long as he is versed in writing. But he won't, unless he is versed in business writing and trade terms. You would not think of having an English machinery catalogue written by a professor of English literature. By the same token, a foreign journalist or professor cannot convey your sales message properly in his language."



LIGHTING EASTER WINDOWS

The feature windows which are a part of the Easter plans of every up-to-date dry goods concern or millinery store should not suffer from inadequate lighting. Now is the time for the contractor-dealer to push the sale of lamps, window wiring, portables, and new daylight mazda effects, not only among the big stores of his community, but among the smaller merchants as well.

Technical Hints

BY GEORGE A. SCHNEIDER

SYSTEM IN HANDLING REPAIRS

There is probably no easier way for the electrical contractor-dealer to thoroughly establish a good reputation among his customers or prospective customers than by paying careful attention to the handling of orders involving repairs to appliances and similar devices used for domestic purposes. Here we have special reference to the dealer who is trying to build up a retail business. At the best many repair jobs are a nuisance and at present factory conditions it is difficult to give the service in handling them that is expected by the customer.

Generally speaking repair parts have been difficult to secure. The deliveries have been long and in some instances the prices at which parts are invoiced seem all out of reason. Then again many manufacturers during the past eighteen months or so have refused to furnish repair parts for some of their older and obsolete classes of appliances and devices. Collectively taken these conditions explain the many difficulties experienced during the war period. The dealers of course understand them. Unfortunately the public in most cases does not. However at this writing there is some relief in sight and the manufacturers are doing their best to supply repair parts promptly. To sum up, while the conditions are not the most favorable to allow good service in handling such orders, particularly when parts must be ordered from the factory, still by strict attention to the little details that are so often overlooked the dealer can at least eliminate the delays or misunderstandings for which he alone may be responsible.

First of all, every dealer should have some simple system of keeping a record of the devices brought in for repairs and some method by means of which they can be promptly identified when called for or delivered to the customer. It is important that a detailed record of the various parts or pieces received is kept because in handling there is always likelihood of the parts becoming separated.

Some dealers use a tag for the purpose of identification and record of repairs needed. The tags consist of two parts numbered alike. The main part is attached to the device and the stub given to the customer to serve not only to identify his property but as a sort of a receipt as well. This scheme will work out satisfactorily only when the main portion of the tag contains a complete record of the device and the parts received. The tag should also show the date device is received, customer's name, address and telephone number, date promised and whether or not any price for the job was fixed. The stub end should show the date, a brief description of the device to which it applies and the name of the party receiving the goods and issuing the tags. These are indeed but simple details. Still it is surprising how much trouble can be eliminated by systematically applying them.

The advisability of following out some such system as just outlined was brought out forcefully during the past few months in connection with the sales of a bankrupt electrical concern. Much trouble was experienced in disposing of the devices left for repairs because the only method of identification was a tag simply bearing a number and consequently the trustee was unable to locate the owners. Many of those who did ultimately call did not have the stub of the tag and could not even identify their own property. Had the names and such other notations as just outlined been made on the tag the entire settlement would have been easy.

Later after this experience the writer took every opportunity to observe just how the various dealers handled this matter. Many were found to be following out this identical scheme. Of course we don't expect cases of bankruptcy every day, but some sort of system is just as necessary for a going concern as in clearing out a bankrupt one. In fact, with the proper system and management there would be little likelihood of a concern becoming bankrupt.

When it becomes necessary for the dealer to send devices to the factory for repairs, the handling of the entire matter will be greatly simplified if the dealer will take caution to give full details as to just what repairs are required. Unless this is carefully done in the first letter or on the order there is always a possibility of misunderstanding or delays for want of more complete details. To assist in handling such orders with the least possible question one of the manufacturers of heating devices has standardized certain words and expressions to cover the various kinds of repairs or other work to be done on his devices that are sent to the factory. While these expressions have to the writer's knowledge only been adopted by this particular concern there is no reason why they cannot be used as a guide in conducting negotiations of this kind with any factory. Accordingly they are given in full in the following paragraphs:

Put in working order: The article is made sound and fit for service. The finish is left as found. Missing parts which are not permanently part of the piece returned are not supplied. A repair tag is attached to the package containing it.

Complete: The article is put in working order and all parts which are normally furnished with a new piece are supplied. The finish is left as found. A repair tag is attached to the package containing it.

Refinish: The article is put in working order and the appearance is improved as well as circumstances warrant. It is not completed. A repair tag is attached to the package containing it.

Make Salable: The article is put in working order, completed, and finished like new. It is equal to new goods in every respect, is packed like new goods and does not bear a repair label. It is as valuable as new goods.

Duplicate: A similar article is supplied and the sample returned to you if it is of use and is worth the transportation charges. Otherwise it is scrapped.

smaller merchants as well.

Replace: If the article is defective we replace it without charge to you. If not defective we refinish it at your expense unless you instruct us to the contrary. We decide upon the merit of your claims. New goods do not bear a repair tag, refinished articles do.

As already pointed out, certain classes of repairs are without question a nuisance. Still they will always be required, so the dealer should try to handle them to best advantage and not overlook the fact that very often transactions of this kind afford an excellent opportunity to introduce new lines or goods. Here it is well to recall the story of the man who went to the tailor to have a new set of buttons sewed on his coat. He got the buttons all right and left an order for a new suit. That tailor was a real salesman.

OPERATION OF ELECTRIC BELLS ON ALTERNATING ELECTRIC CURRENTS

At a recent conference of electrical supply men there was an interesting discussion of electric bells and their application to alternating-current circuits. Generally speaking, bells are considered extremely simple devices and accordingly are discussed at such meetings only from the merchandising point of view. At this particular meeting, however, it was agreed that the proper application of bells to alternating-current circuits also involved questions of a technical nature and that in this respect bells should be placed in the same category as inter-communicating telephone systems or similar signal systems of the more complicated types. It is the purpose of this article to discuss several of the questions brought out at that time and to point out the limitations of certain types of bells for alternating current service.

For this purpose the subject may be conveniently divided into two parts:

(a) The application of bells primarly designed for direct-current circuits to alternating-current circuits, in connection with bell-ringing transformers.
(b) The application of bells especially designed for alternating-current circuits for use with or without transformers.

In this article bells coming under the first of these divisions will be covered. The discussion will be limited to bells of the vibrating type designed for multiple connection. It should be noted, however, that bells for series operation on both direct- and alternating-current circuits are a commercial article and largely used for certain classes of signaling. In a later article to appear in this department there will be a similar discussion on bells designed specially for alternating-current service.

Generally well-designed direct-current vibrating-type bells in sizes up to and including the five-inch size will operate quite satisfactorily from bell-ringing transformers provided the transformer is of sufficient capacity and its voltage suitably adapted to the bell windings. Bells of these sizes are wound ordinarily so that an alternating-current of from 6 to 14 volts, which is common for the secondary of the smaller size transformers, will be satisfactory. Where a number of bells are to be operated from the transformer and some are likely to be at a somewhat greater distance from the transformer than others, it is well to select transformers having several secondary voltages, such as 6, 8 or 14 volts, which gives a more flexible scheme, permitting the voltage of the circuit to be selected according to the size of the bell and length of the line between bell and transformer. The bells which are near the transformer will thus not be given a higher voltage than necessary and the continual burning of the contacts within the bell, which will result from over voltage, will be eliminated.

Bells for this service, no matter what size, should always be of the adjustable type as it is very difficult to get good service from those types which are not so designed. Further, there is likely to be some trouble in getting just the right adjustment, which must be accomplished by bending the springs or contacts, in the non-adjustable style.

The capacity of transformer required can be estimated by allowing approximately 1½ watts per inch of bell diameter and estimating the number of bells likely to be rung simultaneously. Thus, a 3-inch bell would require about 4½ watts and 10 of this size rung at the same time would require about 45 watts. Specially designed alternating-current bells are much more efficient and require considerable less energy as will be shown in the article on these types of bells.

Direct-current bells of larger than about five inches will not ring on alternating-current circuits of ordinary frequencies, no matter how wound nor what capacity of transformer is provided, because the length and weight of the armature are such that it cannot follow the rapid changes and variations in the magnetic field set up by the windings. The armature will stand practically still and the bell will emit a very pronounced hum.

The reason for this action will be better understood by remembering one of the simple principles of physics; that every pendulum or vibrating reed has a natural period of vibration, and that it can be made to take up this vibration by the action of a succession of impulses of force occurring in the same frequency as that in which the pendulum or reed vibrates. A typical and familiar example of this is found in the act of one person pushing another in a swing. The swing has its natural period of vibration, depending on the length of the ropes, and a gentle push applied at proper intervals by the person on the ground causes the swing to vibrate with considerable amplitude. If the pushes are applied at intervals not corresponding to the natural period of vibration of the swing, many of them tend to retard rather than help its vibration, so that a useless bumping results, producing but little motion.

From this analogy it will be clear that to operate satisfactorily on alternating-current service the length and weight of the bell armature must be proportioned and so constructed that the armature has a period of vibration which corresponds to the number of alternations or frequency of the supply circuit.

ELECTRICITY IN A LARGE DEPARTMENT STORE

(A department store represents in some measure every branch of industry and calls for applications of electricity which run from shoe repairing machines to apparatus for electrical treatment and dish washers. The extensive electrical installation of one of the largest department stores of San Francisco is here briefly indicated as a suggestion of the possibilities along this line.—The Editor.)

The problem of lighting is perhaps the most familiar use of electricity in connection with a department store—but by no means the only one. The Emporium, of San Francisco, one of the largest department stores on the Pasific Coast, has an electrical department of considerable magnitude located in its basement work shops—and uses electricity for many of the operations in the cafe, the carpenter shop, the shoe repairing department, the delivery department and elsewhere about the store.

CAFETERIA FOR EMPLOYES

Several hundred employes are served here every day — and all dishes washed by an electric dish washer. A large machine of a different type is used in the public dining room in the main store.

Pumps and General Applications

The main installation is housed in the basement where there are located two air compressors for use with the water system below the level of the city sewer system and two pumps which handle all water for the building, all automatically controlled. A fire pump is also provided which feeds the sprinkler curtain on the west side of the building and is operated by an emergency switch. In case of fire at night in the adjacent buildings which are of less perfect fireproof construction, the switch is thrown by the watchman, otherwise by the engine room attendant who is always present during the period when the building is in use. An automatic interior sprinkler system cares for interior fires which may occur. A vacuum machine is also located here for the general cleaning of the building with outlets located at convenient points throughout the building.

Repair Department

An interesting industrial application of electricity is found in the shoe repair department where a complicated machine sews the shoes, trims the soles, fits the heels and polishes and finishes the work. This makes possible prompt and efficient service with few attendants. The machine extends for some fifteen feet along the length of the enclosure and may be set in rotation as a whole or operated in sections as needed.

Belt Conveyor in Delivery Department

A belt conveyor, electrically operated, connects the wrapping and delivery departments. All orders for home delivery are sent to the wrapping department and there collected in compartments arranged on the order of large pigeon holes which may be reached from either side. It is thus possible to handle incoming goods from one side and extract the materials of an order for wrapping from the other. A long table is conveniently located on the far side of this rack with paper, boxes and string at hand, where the making up of the packages is done. The upper portion of the sales tag is pasted on the outside to give name and address and the package is then placed on the belt conveyor which carries it direct to the delivery department on the ground floor above, where it may be sorted according to its district and transferred direct to the delivery trucks. The conveyor is some two feet in width and conveniently handles packages of all sizes.

A carpenter shop, also located in the back of the basement floor, is responsible for packing boxes, shelving or small repairs needed about the store. A small rotary saw run by electricity is used here.

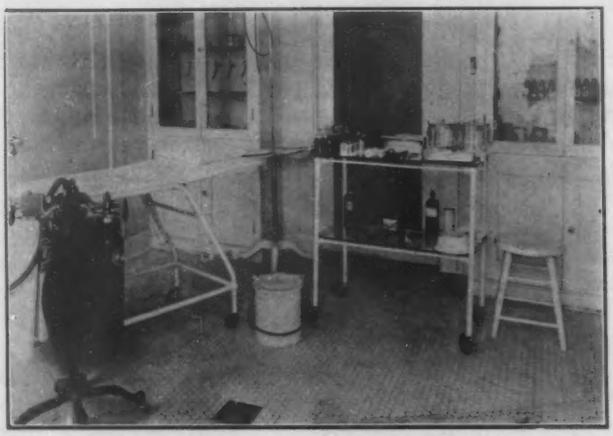
Electricity in the Service Department

The hair dressing department of the main store has several electric appliances, among them a high frequency vibrator, much used to stimulate the scalp or for skin troubles of a nervous origin. A similar equipment is also in use in the medical department of the service building. The service building is a seven story structure adjacent to the Emporium itself in which are located the special rooms for the use of employes. Rest rooms, an auditorium and gymnasium, a cafeteria, class rooms, a pool room, squash court and roof garden and the like are here provided in undoubtedly the most complete service department to be found anywhere in the West. There is a very elaborate medical department here provided with examination rooms, a small operating room for minor operations and a men's and women's ward in which any cases requiring such treatment may be kept over night. Food for such emergencies is to be had from the cafeteria located in the building. The regular hospital lighting system is used in this department with a light over the door showing when the room is in use. The electric vibrator here used has been temporarily transferred to the main store but a new instrument has been ordered and is to form a permanent part of the equipment.

The Dish Washing Machines

A very successful installation is that of the electric dish washing machine in the cafeteria of

this building. Several hundred employes are served here daily and dishes mount up to from 700 to 1000, all of which are handled through the dish washer. It consists of three tanks, the first of which is filled with hot, soapy water, the other two with clear hot water for rinsing into which the dishes are dipped in turn. The water is kept violently in motion by an electric motor and very satisfactorily handles all types of dishes. The things to be washed are piled in baskets on a drain board to the left and thus transferred from one water to the other to a drain board at the right where they are left to drain. At present the baskets are of a simple wire mesh pro-



THE MEDICAL DEPARTMENT
An electric vibrator is installed here to give free treatment to employes for whom it is prescribed

vided with hooks by which they are suspended in the water, but wooden spindles are to be placed in the center for convenience in stacking dishes. They were were originally so arranged but in the long years of service through which the dish washer has been in daily use, the spindles were entirely worn away.

The main cafe, open to the public, is also provided with an electric dish washer of a somewhat more elaborate type. In this case the dishes are stacked in large wooden racks about three feet by two in which partitions of various sizes provide space for dishes of all sizes. Everything is included from glassware to silver, a rather unusual refinement in a mechanical dish washer, these two items generally being done by hand. These racks are filled in succession and pushed along a shelf at about waist height up to the first chamber. This is located at the same level and is provided with sliding doors which need only be lifted and the rack slid in. On closing the door, soapy water at a boiling temperature is automatically swirled through the dishes from above and below. The doors are then raised, the rack transferred to a resting board at the other side and from thence into the second chamber, operated in much the same way. Clear boiling water and steam are used in this second case and the racks are then slid over to a drain board beyond and there allowed to set until dry. This takes but an instant as the steam soon evaporates. A further use of electricity in this kitchen is in connection with a mixer used for whipping cream or eggs, stirring batter, etc. As some forty pies are baked in preparation for a noon's demand, as well as bread baked, cream puffs filled and the like, the mixer is in almost constant use.

Signal Lights

An interesting adaptation of electricity to the special needs of an employes' call service in such a large establishment has been ingeniously worked out. There are certain members of the staff who are often called to different parts of the building where it is difficult to locate them when wanted. In some stores it is customary to use a series of electric bell signals, but this has many features which are objectionable. The Emporium has installed sets of call lights at various points throughout the store. There are six lights of different colors which are operated from the telephone desk. Each official likely to be called for has his combination of lights which may be flashed on all over the store at once. As soon as he sees his light or lights, he communicates at his earliest convenience with the telephone switchboard and learns where he is wanted and for what purpose. Thus a visitor calls to see the Welfare Director who at that moment happens to be talking to the head of a department in the basement. Some one in the office of the Welfare Director communicates this fact with the telephone station who flashes on the lights. The Welfare Director notes her lights appear on the board above the aisle near the department in question and calls up the central office to learn that some one is waiting.

Electricity is, in short, the very good servant of the store, utilized wherever convenience has suggested that its application is possible.

ENGLISH NATIONAL KITCHENS

A description of the equipment of a "national kitchen" installed at the public baths, Wandsworth, is given by the London Electrical Review. The electrical equipment comprises two fish fryers, four boiling plates, and two "F" type roasting and baking ovens, a five-tier electric steamer being on order. The ovens are of substantial cast-iron construction and are lagged on all sides; standard B. and K. elements are fitted at back and sides, the loading being at full heat 7.2 kw. Heat control is effected at a switch panel mounted above the oven; two rotary three-heat switches, double-pole fuses, and pilot lamps are provided.

The four boiling plates are each fitted with a 6-in. open-type ring mounted flush with the surface of a polished cast-iron plate measuring 18 in. by 11 in., each ring being loaded to a maximum of 1.2 kw.

The electrical equipment will have a connected load of 28.2 kw. when the steamer has been installed. The cookers are balanced across the three-wire a.c. system, the pressure between outers and neutral being 205 volts. All baking, roasting, fish frying and boiling will be done electrically, and much of the duty at present carried out by steam will be performed by the B. and K. steamer when it has been delivered.

THE BUSINESS LIBRARY

BY LOUISE B. KRAUSE

(Check up the amount of time wasted by the average business man through lack of having the information he wants at hand. The business library is the service department in your business which saves you that time. If your concern is too small to afford a librarian, it is nevertheless in need of the librarian's method of handling records. This is the first of a series of articles by the well known librarian of H. M. Byllesby & Company. Attention is called to the fact that this material is copyrighted — reprinting is permitted only on special application. —The Editor.)

THE ORGANIZATION OF THE BUSINESS LIBRARY

What is meant by the word library? Twenty-five years ago it could be accurately defined as a collection of books on a series of shelves, and although this old definition still partially describes its present form, the true interpretation of what a business library really is, can be stated best by saying that it is a genuine service department, whose chief business is to give information to the members of a firm on subjects of vital importance in the conduct of their business.

The Southern California Edison Company's files of documents and periodicals are attractively stored in the special library of the new Southern California Edison Building in Los Angeles and made a vital asset by being placed in charge of a trained librarian.

The business library is not limited to a collection of books, but contains information in any form, namely, periodicals, pamphlets, trade catalogs, photographs, lantern slides, and also manuscript notes which are accumulated in connection with the specific work of an organization. The business library even goes so far in its service as to supply information which is obtained by "word of mouth" in advance of its appearance on the printed page.

The Evolution of the Business Library

Before the business library came into being as a special department of business organizations, and before public libraries were making a specialty of collecting information on business subjects, the business man picked up his supply of information in haphazard fashion. He either was told by a business acquaintance,—often a salesman of a special line who was doing business with him,—of some trade literature or government documents in which he would find useful information, or he discovered references to valuable books, pamphlets or documents in his casual reading of newspapers and periodicals. As a last resort, in cases of emergency he telephoned to various business organizations whom he thought could tell, out of their experience, what he wished to know.

An example of a practical library equipment is that of the Commonwealth Edison Company in Chicago. The library is in constant use and is particularly popular over the lunch period. Note the excellent indirect lighting.

Business has, however, grown too large in its multiplicity of interests for the business man to get his information in so desultory and unorganized a fashion, for the business man must be a good forecaster and interpreter of conditions, not by means of guesswork but by the aid of obtainable facts, and he must study and analyze a large number of related subjects. The success of many of our richest industries is due in large measure to this particular element, the wise forecasting of conditions to come, for, as a recent periodical article stated, "business is a procession of problems; big or little, any business must keep moving ahead, finding its way past one pitfall and obstacle after another. In another sense business is a matter of vision; the foresight that looks long ahead to new opportunity and to the ways and means of realizing it, is an essential in the growth and progress that brings success."

Business men have long since recognized that rule of thumb methods have passed away, and that they not only can not learn by experience exclusively, but that the utilization of the knowledge of other men recorded in reliable business data is of the highest value.

Present day competition makes it imperative also that every business man know as much as his competitor does, and he must have therefore not something on a subject but everything of value on a subject, and it must be exact and authoritative

information which he can trust. Business data must also be kept strictly up to date, which under present-day conditions is no easy task, as information is out of date almost before it is off the press.

The business man not only needs to collect accurate, exhaustive, up to date information, but he needs to have it so well organized that he can put his fingers, at a moment's notice, upon the exact information he desires. The systematic organization of information into quick working files means an

The library of the People's Gas Light & Coke Company of Chicago is a most comfortable place to seek information. The room has a large fireplace at one end and the built-in book cases and file drawers are of mahogany.

enormous saving of time and money, and in large business organizations the employment of a trained librarian to do this work is a most valuable asset.

Check up if you can, the amount of time wasted annually by the average business man through lack of having the information he desires immediately at his service. Waste of time means waste of money. It is not worth while having an expert, whose time may be worth anywhere from twenty-five to one hundred dollars a day, waste any of it in trying to find information in government documents, which he is not particularly adept in locating, because he lacks a working knowledge of the enormous range of government publications.

The writer is acquainted with an engineering firm of national reputation, which has made a collection of library material, which has been cared for, or rather much neglected by a stenographer of the company, who has no time or library experience to give to its adequate administration. This firm when urged to introduce organized library service, and thus make their collection effective, stated that their library was not used enough by their organization to warrant the expense. Investigation proved, however, that one of their chief expert chemists, whose time was valued more per week than that of a trained librarian would be per month, was making a systematic business of hunting his own library material, and had listed his references in many closely written notes, in order to be able to locate the material again if he should need it. The value of the time the chemist spent on his research would have covered a librarian's salary and made it possible for him to give more time to his firm on the problems which his expert knowledge was able to solve.

General Principles of Organization

The essential principles in organizing a successful business library can be briefly stated as follows:

Centralization of material within the business organization.

Coordination of the business library with the facilities of the public and special libraries of the city in which the business library is located.

Centralization of Library Material

The first step in establishing a library in a business organization is the centralization of all the printed material available in its different offices or departments. This is exactly what is not done in a large number of business houses. Books, pamphlets and other valuable information are scattered among the various members of the organization, who treat them as personal property and preserve them in their private desks as carefully as a squirrel hides his store of good nuts. In many business organizations the policy of the employes in regard to information seems to be, to hold on to everything of value for one's personal use, regardless of how much value the information might be to another member of the organization, and also regardless of the fact that the material has been paid for out of the company's funds.

It should be said, however, in defense of the practice of not putting information into a central library, that it is not always based upon thoughtless or selfish habits, but upon lack of confidence; there is a fear that if information passes out of the hands of the man who may wish to use it again some time, in a hurry, that he may not be able to locate it promptly, if in a central library. This feeling is not without reasonable foundation, as it is based on the irritating experience which some business men have had in using central correspondence files which, in many offices, are poorly administered and cannot produce desired information promptly. The business library, when administered by a qualified librarian, not only can produce all filed material promptly, but in one large corporation, known to the writer, has so successfully handled material that the officers and employes send their information to the library, as a safer and more reliable place to keep it for quick reference, than the drawers of their own desks.

Centralization of library material gives all the departments the benefit of everything the company has collected on a special subject, and often makes it unnecessary to duplicate information for the use of several departments.

The fact that a central library department has on record what material is temporarily or permanently kept in all the departments, makes it possible also for it to act as a clearing house between all departments in locating desired information. This principle does not apply of course to corporations of such magnitude that their activities comprise several distinct lines of business; in such a case each department would require a specialized collection of information, which would become the library of that particular branch of the industry.

THE FUTURE OF THE AIRPLANE IN BUSINESS

BY C. B. MERRICK

(The problem of landing places in congested city districts is the chief difficulty in the way of the commercial plane. Landing places without the city and good roads the country over offer a simple solution, however, and the practical commercial use of the aeroplane seems an early possibility. Electricity plans an important part in training aviators and in marking landing places and guide posts.—The Editor.)

With a military truce in force and peace negotiations under way, the problems of peace move out into the foreground of the world's interests. All industries have been speeded up and non-essentials have been eliminated to bring production to a maximum. In our readjustment to normal conditions, are we going to fall back into the pre-war ruts or will the demand for speed be continued in our daily lives?

INSTRUCTING AVIATORS BY ELECTRICITY

One of the methods used for instructing the soldier aviators, in which electricity played its part. The bright spots indicate the positions of small incandescent lamps behind the screen on which the airplanes appear in various flying attitudes. These were all flashed on for the picture, but ordinarily are not visible. Aiming and firing practice is accomplished by sighting a dummy machine gun at the position ahead of the plane so that the time of travel of the bullet will be the same as that of the plane, and therefore it will reach a vital spot. After the sighting is completed, the lights are flashed on and the gun setting is checked by them. The three spots indicate the correct setting of the gun for various plane speeds of 75, 100, and 125 miles per hour.

Will we dismantle our specially equipped factories and dismiss their trained mechanics, or will we take advantage of one of the greatest gifts of the war by applying their products to peaceful conditions?

This query applies particularly to the airplane which has proved beyond question that it is a military essential to victory, and that any future army worth the name must be well equipped with the latest and best designs. This means that military research, development, and production of planes must be continued. That nation will be most successful in military planes which utilizes the largest number of planes in its peace time pursuits, and obtains the advantage gained by the experience of their use. This will also be the least expensive and least disturbing procedure in an economical way, for fewer specialized factories will have to be reconverted to other uses, and fewer men skilled in this particular art will need to shift again to other occupations. In case of future need for military production, the factories will be on a manufacturing basis and the long and unfortunate delays in obtaining men, materials and machinery will be avoided. The result of this saved time in planes put out should be of untold value.

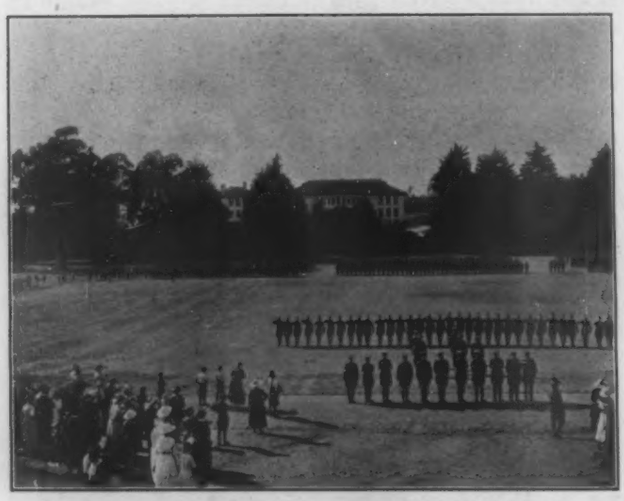
Time is very necessary for building a new and immense enterprise as has been proved by our recent experiences. Consequently we have just reached a maximum of production at the time when the great need is reduced to a fraction of its former value.

We now have at our disposal this magnificent equipment in men and planes to use as we desire. The knowledge gained in four years of intensive struggle is available. America has again taken up her place in the forefront of the nations, after falling ignominiously laggard in aviation matters. The airplane, perfected first in America, was allowed to become the property of other nations, quick to see its advantages, while she rested on her laurels.

The smallest aeroplane built—a factor which will greatly simplify the landing problem. It is one of the speediest machines for its size, measuring nineteen ft. in width. Is fully equipped to carry an electrically heated uniform which is worn by the pilot when riding at high altitudes. The picture is copyrighted by the Keystone View Co.

After an unprofitable siesta she has regained her place by producing and standardizing the Liberty Engine, the equal of any engine built, and by quantity production of planes. She has also recently regained the record for altitude flight, when Capt. R. W. Schroeder at Dayton, Ohio, flew to the elevation of 28,900 feet in an American built airplane, propelled by an American built engine. This is merely an illustration of the perfection to which these machines have been brought. The great war has developed specialized planes which accomplish their particular duties with wonderful ability. Accuracy of design has reached such a stage that a plane can be built with practically any desired characteristics. A speed of 150 miles per hour has been attained as well as a climbing ability of over a thousand feet a minute. Some types have been so constructed that

it is almost impossible for the pilot to damage the plane by any stunts in the air. A very general false impression prevails among the general public not thoroughly familiar with the details, that all airplanes are exceedingly dangerous for their passengers and all concerned with them, and that they are anything but substantial in construction. This is only natural in a new and extraordinary field, particularly with the secrecy imposed by war conditions. A campaign of education must be undertaken for the benefit of the general public, which realizing the new possibilities will be quick to grasp them.



THE MEN WHO CAN PILOT THE MACHINES

The Aviation Cadets at the University of California, with the graduating class in the foreground. This shows a part of the men in training at one of the many similar ground schools located throughout the nation. Large numbers of our soldiers have had the advantage of this intensive and expensive training, and their knowledge is now available for developing and improving the aerial industries.

Most of the effort has been expended in producing fighting qualities, consequently redesign and adaptation will be quite necessary for peaceful demands. This should not prove an insurmountable task, as the demands of the war, greater than any previously made, have been met so fully. The world has learned to what an extent it is dependent on its engineers for the very necessities of life, and how problems are best met by systematic and concentrated study of the subject at hand. In the future the engineers must take their place in solving the nation's economic and social problems. The world war has done an irreparable amount of damage, but the possibilities for good results are large.

The proper guidance of the tremendous impetus given to the plane design and production will place America at the head of the nations. Mail routes between our largest cities have already been established. These are being extended as rapidly as possible, and should be supplemented by passenger lines, ultimately covering the whole country. These routes may not be entirely self-supporting at the start, but should soon prove profitable because of the wonderful saving of time for their patrons. The railroads have redoubled their efforts to reduce operating time between our large cities, by minutes or possibly an hour. The airplane cuts this time to a fraction of its former value, and brings our cities much closer together. It will not, of course, eliminate the railroad and other means of conveyance but will operate in conjunction with them.

This brings us, then, to the necessities for establishing such routes. First and foremost, we must have landing fields for our regular stations, and for emergency use. All our aerial activities must start from these points, and due to present construction, these fields must permit a lengthy run for accelerating in taking the air, or for landing purposes. The shape of the grounds should be square, because a landing on a long narrow strip with a cross wind is a task for skilled pilots only. Difficulty has already been experienced in providing such landing places near our large centers. The good road then becomes a necessity to connect our landing places with the centers of population, and these good roads themselves will shorten our lines of communication. In a rolling country the cost of a level landing field would far exceed the cost of good roads to a more distant and suitable tract, while the roads will act as feeders for our planes and other transportation systems.

For emergency use the aviator must use the open space at hand for his landing. The radius of his travel after his engine stops, even from high altitudes where he is safest, is not over eight or ten miles, so until the country is dotted with landing spots at intervals of fifteen miles, the pilot must land as best he can. Here again the good road will serve him. A landing can easily be made on its surface, provided it is wide enough to allow for the span of his wings. Thus, undoubtedly, many serious accidents might be avoided in forced landings.

While the aviator is in the air the roads will be distinctive landmarks and guides for his use in determining his course. The more direct the roads the more value to the pilot. The future of our aviation program is then intimately linked with our policy of road building, and here in the West, the combination of the two will be as nearly ideal as possible. We have already pursued a constructive policy for our roads, and our weather conditions are such that all the year round flying is more practicable than in other localities. The gates are open for entering into a new phase of commercial and industrial methods.

FOURTEEN RULES FOR ELECTRICAL CONTRACTING PRACTICE

The following Code of Practice is recommended to architects, consulting engineers, contractors and owners as well as owners' engineers, by the National Association of Electrical Contractors and Dealers, the Executive Committee of which adopted and approved it as a step toward the standardization of many practices in connection with the original contracts and those for extras which, unless definitely settled in advance, leads to misunderstanding on both sides and frequently to controversies and litigation. The National Association does not, however, attempt to bind its members to use this code, but respectfully submits same for the approval of both customers and contractors.

Rule XI. If the regular and normal progress of the work is held up due to extras or changes or other causes over which the contractor has no control, an interference or interruption charge shall be made, depending on the extent of the interference or interruption.

RAILWAY ELECTRIFICATION IN WASHINGTON

(Little has been heard in recent months of the railway electrification in the Northwest, but the work is progressing and it is expected that trains will operate through the Cascade Mountains by September first. Here is a review of the present status with a brief description of equipment and construction work.—The Editor.)

The Puget Sound section of the State of Washington, the scene of the state's greatest commercial and industrial activity, is soon to have its prestige greatly enhanced. About July 1 of this year, the Chicago, Milwaukee & St. Paul Railway will begin operating its trains electrically through the Cascade mountains. By this electrification much of the handicap occasioned by the existence of a high range of mountains between Puget Sound and the east will be removed.

The electrification covers 218 miles between Othello in eastern Washington and Seattle and Tacoma, and such was the consequence of the work that it has not been interrupted by the fact of war. The poles and fixtures necessary to the support of the power-transmission wires, as well as those for the trolley, feeder and other wires, are practically in place. Between Othello and Tacoma the substation buildings have been finished and much of the substation equipment installed.

Progress on Substations

There are eight substations situated approximately 28 miles apart, of brick construction with tar and gravel roofs. The roofs are flat with two exceptions, these being in the region where the snow fall is heavy. The substations are at Tacoma, Renton, Cedar Falls, Hyak, Cle Elum, Kittitas, Doris and Taunton.

Taunton substation is 9.2 miles west of Othello, where a connection is made with the Long Lake hydroelectric station of the Washington Water Power Company, by a 110,000 volt transmission line 170 miles in length and a connection is made at Cedar Falls substation with the Snoqualmie plant of the Puget Sound Traction Light & Power Company, where a substation is being erected by the last named company in which the generator voltage is to be stepped up to 110,000 for transmission to the railway company. The new substation of the traction company will contain three 4500 kva. transformers, General Electric type, and one held in reserve, all outdoor installations. Special type of large disconnecting switches is also included, being supplied by the Electrical Engineers' Equipment Company, Chicago. The Milwaukee constructs its own transmission tie lines.

Power Line Construction

For the power-line construction between Taunton and Cedar Falls the Milwaukee company is to make use of 6-strand No. 00 copper cable with hemp center which makes a 133,000-circular mil cable with a diameter of 0.446 inches. From Cedar Falls to Renton and Tacoma by way of Snoqualmie Falls, the line has six strands with hemp center and cable diameter of 0.938 inches. For the Long Lake-Taunton line seven No. 8 wire are used, which gives a cable of 0.3855 inches and 115,000-circular mil area.

Details of Equipment

The substations were built by the Milwaukee Company. They are T-shaped with a 50 by 84 foot high-tension room in the rear, and a 40 by 60 foot room in front for the motor generator set. The Westinghouse Electric & Manufacturing Company is equipping the substations at Taunton, Dorris and Kittitas and the General Electric Company those at Cle Elum, Hyak, Cedar Falls, Renton and Tacoma. At Taunton and Tacoma the stations are two-unit with two units to be installed. Cedar Falls, Doris and Hyak are three-unit stations, with two units installed at each point. At Cle Elum and Renton the stations are two-unit with one unit installed in each case. These units are all 2000 kw.

The type of equipment installed by the respective companies in these substations will be understood from the following descriptions: Westinghouse Electric & Manufacturing Company installed the equipment in the Taunton substation. This substation contains two oil insulated, self-cooling tubular type transformers for indoor service. They are of the shell type, 2500 kva., three-phase, 60 cycles, with high-voltage winding for 102,000 volts, and low voltage winding for 2300 volts. There are additional taps on the high-tension winding to give 97,200 and 92,400 volts at full capacity. Taps for 1150 volts are provided on the low tension winding to supply the starting voltage for synchronous motors of the motor generator sets. The transformers are connected in star on the high-voltage side and in delta on the low-voltage side. Each transformer is connected and has the corresponding capacity for supplying one motor generator set.

Flat coils make up the high-tension windings to make sure that the low-voltage stresses between coils is kept low. Each of these coils is wound with layers of thin copper ribbon, which is bare, but as the coil is wound the conductor is automatically insulated with layers of paper and cloth applied through a folding tool.

Taps are placed in the body of the high-tension windings rather than at the ends to avoid exposure to the effects of line surges. Low-tension coils are made up of rectangular copper conductors in multiple, each covered with two layers of cotton insulation. Transformer tanks are made of boiler plate, with cover bolted to the top, a gasket between tank and cover to make them air tight.

Leads and taps from high-tension coils are connected to the terminals, which are carried by insulating supports mounted upon the barriers between the coils. This makes a terminal arrangement free from grounded supports. The three high-tension leads are carried through the cover by bushings of the condenser type. The five low-tension terminals are brought through bushings in the cover, terminal boards being mounted inside the transformer case.

There are two motor generator sets in the substation, each consisting of 1000 kw., 6-pole, 1500 volt direct-current generators connected in series and driven by a three-phase, 60 cycle synchronous motor, the motor and two generators being on the same shaft and bedplate. The shaft has an exciter at each end, one for the generators and one for the synchronous motor. The normal full-load output of each set is 2000 kw. at 514 r.p.m., 3000 volts, 667 amp. Exciter for generators is rated at 10 kw., 125 volts; exciter for the synchronous motor is rated at 30 kw., 125 volts. By a special winding the power-factor on the motor is automatically held at 95% leading when delivering maximum load, with provisions for adjusting the power-factor setting to give unity or leading power-factor between one-half and full load.

Feeders of the power company are controlled by 110,000-volt, 200 ampere, remote controlled, hand operated oil circuit-breakers which have a very high ultimate rupturing capacity at the arc. Bushing-type current transformers operating the protective relays are provided for these. From a panel located in the middle wall each coil circuit-breaker is controlled and upon which is mounted the controlling, operating and indicating mechanism and disconnecting switch. The incoming power line and railroad 3000 volt feeder lines are equipped with static voltage detectors. Nine panels are contained in the chief switchboard. There is one resonant shunt to be connected across the 3000-volt direct-current busbars, to be so proportioned that it will shunt out the harmonics caused by slot action in the machines.

The Westinghouse flash suppressor is a feature of the equipment. This is a combination of electrically operated switches that work to create a short-circuit across the collector rings on the armatures of the direct-current generators, acting at once upon any sudden rush of current greater than that for which the combination is adjusted. The result is to kill instantly the direct-current voltage and suppress any tendency to flash over at the generator commutators.

Cedar Falls Substation

The Cedar Falls substation was equipped by the General Electric Company and has two 2000 kw. motor generator sets, two 2500 kva. step-down transformers, and switchboard equipment. The oil-cooled transformers have steel plate tubular tanks and the high-voltage winding has approximately 5 per cent taps. The low voltage is provided with approximately 50 per cent starting taps in the same manner as those contained in the Westinghouse equipment. If the total rated capacity available on busbars or circuits to which switches are connected does not exceed specified limits, the oil switches can safely protect the machines and feeders under short-circuit conditions. The 110,000-volt circuits of the power company and the railroad transmission lines are controlled by large circuit-breakers, while the transformers are controlled by 100-amp. circuit breakers. As is the case with the Westinghouse substations, these oil breakers are operated from panels located in the middle wall.

The two motor generator sets each consist of one 2300-volt, 2500 kva., three-phase, 60 cycle synchronous motor, started from transformer taps, direct-connected to two 1500-volt, 1000-kw. generators, connected in series for 2300 volts direct current, and two 125-volt exciters rated at 30 and 10 kw. The switchboard consists of a panel for each of the motor generator sets, panels for two 2300-volt direct-current feeder circuits, storage battery panel, auxiliary light and power panel for station use, a panel for the power company meters and one for power limiting equipment.

The 3000-volt direct-current feeder lines are continuous between substations with taps to the trolley line every 1000 feet. Return circuits are made up of a No. 4/0 copper cable strung on the feeder-line poles connected at intervals of 8000 feet, to the running rails. This cable is to prevent the interruption of circuit and dangerous voltage at the rail joints if bonds are broken. Necessary current for automatic signaling is also transmitted by the running rails so that the only cross connections between main-line tracks will be the reactance bonds when connecting with signals.

The catenary type of trolley construction is used and consists of two standard No. 4/0 grooved wires for which hangers are alternately spaced and separated for each wire by an average distance of 15 feet. There is no rigidity of connection between the two wires. Thus flexibility of support is provided, giving the increased trolley contact surface and current carrying capacity necessary in high speed conditions. One trolley wire is all that is provided on passing tracks and yard tracks. The normal height of the trolley wires above the top of the rail is 24 feet 2 inches, while the minimum height, having relation to bridges and tunnels, is 19 feet.

Westinghouse Electric & Manufacturing Company is also furnishing a power indicating and limiting system apparatus. Similar apparatus has been in operation for some time on the Milwaukee Company's Rocky Mountain Division in Montana and consists of providing a convenient means of measuring and recording at some designated point, the entire power necessary to operate the newly electrified territory, and providing the means by automatic lowering of the direct-current substation voltage of limiting the maximum demand or the output of a particular substation to a certain predetermined amount. The indicating and limiting apparatus in the substations and dispatcher's office is connected by a circuit consisting of two No. 8 B. & S. copper wires on the trolley poles. This circuit extends from Taunton, the most easterly substation, passing through each substation to the dispatcher's office, its frequency in any section being dependent on the load in the substations east of that point.

Locomotive Design

Locomotives for this line are being built by the Westinghouse Electric & Manufacturing Company and the General Electric Company, ten by the former and five by the latter.

The Westinghouse locomotives will have two main running gears, each having a four-wheel guid-

ing truck, three driving axles in a rigid wheel base, and a two-wheel trailing truck. The whole running gear will be composed of two Pacific type running gears coupled together with the two-wheel trucks on the adjacent ends. On the running gears a single cab will be mounted. Motors will be of twin armature four-pole type, having two armatures connected permanently in series and carried in a common frame. These two armatures are to be geared through a single gear to a quill surrounding the driving axle and carried in bearings in the motor frame.

The General Electric Company locomotives will be of the through passenger type and will be equipped with steam heater, train lighting apparatus, and 12 gearless motors; two four-axle rigid trucks, and three axle guiding trucks. A separate cab in the center will contain the heating equipment. That portion of the cab extending toward the end of the locomotive from the operating cab will have a rounded form resembling to an extent the shape of the present steam locomotive ahead of the engineer's cab.

It will not be necessary to purchase freight locomotives as the present locomotives used for passenger service will be changed in their gears so as to adapt them for freight service. The passenger service will be handled by the new locomotives above described. Each of these locomotives will have a capacity corresponding to that required to haul a load of 960 tons or about 12 cars, in a continuous run over any part of the profile between Harlowton, Montana, the eastern terminus of the present electrification, and Tacoma and Seattle. The speed varies from 60 miles an hour on the level to 25 miles when ascending the heaviest grades. Under the plan of control regeneration will be permitted on down grades.

This is the most extensive electrification of its nature now being carried through. Taking into consideration the 440 miles of line which the Milwaukee company previously electrified between Harlowton, Montana, and Avery, Idaho, the company will have on July 1st of the present year 660 miles of trunk line electrified.

Engineering and construction work are being handled by the electrification department of the company. R. Beeuwkes is electrical engineer in charge, and F. B. Walker superintendent of construction.

SELLING ELECTRICAL GOODS IN CHINA

(West Coast trade with the Orient is again taking shape—and awaking to the vast possibilities in the practically undeveloped field of China. The United States as a nation stands well with the Chinese and American goods have a good name,—it remains only to take advantage of that country's needs and tendencies of growth as they are pointed out in these interesting extracts from the report of a special investigator in the Orient.—The Editor.)

Growth of Electrical Imports —

Those who have never been to China are likely to think of this nation of ancient civilization as it was presented to them in their school geography. They have not comprehended a change in other parts of the world similar to that in our own. As a matter of fact, however, there has been a gradual development in that country due to more intimate contact with foreign civilization, to better transportation facilities, and to a slowly increasing earning power.

In the sale of electrical goods, prime movers, machinery, propellers (as boilers, turbines, etc.), the pre-war years showed the imports from the United Kingdom to represent 65 per cent of the total, while the direct imports classified under "electrical material and fittings" showed that less than 8 per cent came from the United States.

The people of China have shown a progressive tendency and with its great population and increasing purchasing power, an increase of a very small percentage of the people will make a large aggregate. As an instance, it is shown that one per cent of the population aggregates three times the population of New Zealand alone. Not only do the numerous wealthy merchants and officials appreciate modern conveniences and comforts, but as one passes along the streets where electricity is available he is struck by the number of small shops that have electric lighting. Not only this, but they appear over rather than under lighted, showing they are liberal consumers.

The strong present market lies in the furnishing of apparatus and materials for new stations. This market is being developed faster than one would expect.

Future Possibilities —

While a fair volume of electrical trade is possible now, the great volume of trade with China will come with the greater development of the country; this will increase purchasing power, which will result in a more extended use of electrical service. Combined with earning power, education will also result in better living and everything that goes to make up a higher standard of living.

Conditions of Trade —

Those who wish to meet success in entering this market must bear in mind that first of all they must arrange for proper representation; that, secondly, they must have goods adapted to the needs of the Chinese under existing standards; and that they will find it a great advantage if their representatives in China are able to extend moderate terms of credit to native companies that may buy central station apparatus and materials. American goods have a good name and the United States as a nation stands well with the Chinese. If American electrical manufacturers are willing to cultivate the market in a broad-minded, thorough manner, China affords an export market almost as rich in its potentialities as all of South America. It is relatively a small market

today, but—and this may be of advantage—a great one tomorrow.

This information, together with an interesting description of the climatic and living conditions; language and educational facilities; postal and transportation facilities; agriculture, mining and timber resources; manufacturing industries, and a complete account of the electrical industry, is given in a bound illustrated monograph, comprising over one hundred pages, issued by the Bureau of Foreign and Domestic Commerce under the title "Electrical Goods in China, Japan, and Vladivostok," written by R. A. Lundquist, Trade Commissioner of the Bureau, who was sent to those countries by the government for the purpose of making a thorough investigation at first hand.

From this account we learn the two main amusements of the Chinese appear to be their theaters and teahouses. Attending a Chinese theater in a large port one evening, the writer was struck by the good ventilation, in spite of the fact that both men and women were smoking. The electric lighting also was ample and was disposed so as to have little unfavorable effect on the eyes. Electric fans on both ceilings and walls were in operation.

Of interest to engineers is the fact that at Canton a store termed "universal providers" not only has all the usual appurtenances of an American department store, but recently added a foundry department and a machine shop, which is a step ahead of their American contemporaries.

It is impossible in a review of this kind to give electrical goods, and those interested are therefore directed to Mr. Lundquist's report. It may be said in passing, however, that a complete analysis is given of central-station, development factors, practice and management, of generators, switch-board and switch gear; transmission and distribution equipment; underground cable; bare and weatherproof wire; poles and towers; crossarms, insulators, and pipe-line hardware; transformers; street lighting fixtures; motors and controlling apparatus; electric railway equipment; meters and testing instruments; lamps; batteries; electric-vehicles; farm-lighting plants; telephone and telegraph equipment; wiring supplies and lighting fixtures; fans and other domestic and office appliances and other electrical equipment.

Market for Special Apparatus —

It is but possible to make reference in a general way to a few of these. We learn that while a great amount of bare wire is used, the tendency seems to be toward the use of weatherproof rather than uncovered wire for distribution lines and in the past most of this has apparently come from Germany or England. No triple-braid weatherproof wire so far seen comes up to good American wire in quality, and prices are not materially lower than those that could be made by manufacturers in the United States.

Insulators are of porcelain, generally white in color, and are usually bought complete, with pin and washer. In the past Germany, England, and the United States have sold in this market.

Prior to the war the chief competitors in the field for transformers were one of the American companies, a German, and two of the large English companies. American transformers used in China have a very good reputation, only one complaint being made. This was in regard to small-size three-phase units, of which the general criticism was made that they were not so satisfactory as the best British transformers of the same type.

In the past street-lighting fittings have come from England, Germany and the United States, but in future Japan will be a competitor.

The gradual electrical development in China is bringing an immense market for motors. The business will not be in large units as a rule, but rather the reverse, since a great deal of the demand will be for low-horsepower motors for work that has hitherto been done by hand, horses, or by mules, such as small rice or bean-oil mills and machine shops. The development of railroads will bring a large market for motors, since electric drive will be employed in all new railway machine and repair shops, and mining on a large scale will also create a broad field for the sale of electrical power apparatus of all kinds. In addition there will be more cotton mills, silk filatures, cement mills, cold-storage plants, etc., which will mean increased demand for electric motors. From this development will come the market for larger-type motors, but the volume of business during the next few years will likely be in the smaller capacities, motors of 2 to 25 horsepower.

In the past England, Germany, and the United States, with Japan a growing factor, have supplied most of the motors used in China. In direct-current lines, American motors are generally high in price, the British and Germans competing with each other closely in normal times. In alternating current motors the American manufacturers compete well, quality considered, and in single-phase lines they show not only better operating characteristics, but lower prices as well.

Single-Phase Motors —

In Shanghai, American single-phase motors have not been strongly represented in the past, apparently, but if properly pushed there are several makes that can do considerable business there. American single-phase motors are the best in the market, the only strong competition noted coming from England. The British competition can readily be met when American motors are locally represented, and well-known American designs are being sold to British central stations, owing to their marked superiority and better price. This is one of the few instances where higher-quality American apparatus sells at a lower price than its inferior foreign competitor.

While American manufacturers will not be likely to do much business in direct-current motors, of which there is a great amount anyhow, they should sell a considerable number of alternating-current motors in spite of a somewhat higher price.

The market for electric elevators is small, though growing, and is confined to a few of the largest cities. The Chinese are good builders and like

to have elevators in buildings where there is any need for them.

Portable Instruments —

At present China presents only a limited market for portable instruments, but in this line American manufacturers may do a little better, since quality is more of a factor in this type of instruments than in panel meters. One field for portable instruments, and switch board types as well, that American manufacturers can cultivate is the market afforded by the development of the technical school in China. By furnishing instruments to these schools at a small margin of profit at the start, not only is there an opportunity to secure such business in the future at better prices, but the student will become accustomed to good instruments and will not be satisfied to use inferior meters when he completes his course and takes a position in a power company.

The meter business is growing rapidly, as new plants are being installed. In 1918 they were imported in the amount of over $40,000. The market is largely for alternating-current types. The American alternating current meter can compete with foreign makes. Prior to the war only one American manufacturer seemed to be at all active, but since then two or three others have arranged for representation and have sold a fair number of meters. Foreign meters do not have the quality of American meters. Not only are they less accurate over a period of time, but they seem to deteriorate more quickly under the climatic conditions.

American exports of batteries have been of fair value, the amount being (for China and Hongkong) in 1918, $34,419. In the dry-cell line American manufacturers are in a better position and there is a good market, the majority of the telephone systems being of the magneto type. The climate is such that cells do not dry out as in some countries and the normal life is longer. There should be an opportunity for American manufacturers to do a fair amount of battery business in connection with the sale of electric vehicles.

Telephone Equipment —

In equipment and in telephone instruments since the war began, competition has dropped to practically nothing, and the United States and Japan are furnishing the market, with a few others coming in. When normal conditions are re-established, it is believed that American telephone manufacturers will be able to compete readily for exchange equipment and subscribers sets.

Before the war British and German cable held the market. On the other hand, an American telephone engineer in China said American manufacturers could compete with other makes of telephone cable. In other classes of line materials, besides cable, American manufacturers can furnish such items as steel pins and pole hardware to some extent. Very little in telegraph line has been bought in the United States.

Before the war American, British, German and Dutch, and to some extent, Japanese wiring materials were on the market, British and German houses sold the bulk. In wire England and Germany sold the most, with the United States getting a little business. Now the United States, the Netherlands, and Japan have been supplying the market, with the Netherlands dropping off as shipping conditions became acute.

Screw sockets of both American and Japanese manufacture are being sold in China, the latter resembling American types and many being made by a Japanese manufacturing plant in which American capital is invested. These latter sockets made in Japan are not so good as those made in the United States, however, according to users. While Japan will be a serious competitor in this line, it is believed that American manufacturers can compete in normal times, both in standard types and in a type similar to those developed by Germany.

Electric Fans Popular —

Only one item in general domestic and office appliances is selling to any extent in China; that is the electric fan, which is universally used on account of the hot, humid summer weather, and which is one of the most important of American electrical exports to that country. In 1918 those exported amounted to $173,520, the American trade having trebled when the war removed European competition. At present half a dozen good American fans are on the market.

Fans not only are given severe usage in China, as they are often operated continuously for a whole day or more, but the humidity causes insulation leaks and breakdowns. It was said by one dealer that a certain American fan was the only one that can be run continuously without difficulty, that Japanese fans get hot quickly and also show leakage. In ceiling fans American types have an excellent hold on the market.

It appears that it is possible that certain types of small American signs for use in windows can be sold in China. The Chinese appreciate sign advertising and seem willing to use electricity in connection with it.

While there will be a small but increasing demand in China for the best in all lines of electrical goods, coming from the wealthy Chinese as well as from foreigners living in the country, importers state that China, generally speaking, wants apparatus and similar large equipment of the best, but that in minor devices, supplies, and accessories the cheapest will be favored.

A considerable number of Chinese have taken engineering degrees at American universities and many have later spent some time at work in American factories and plants. Returning to China these men can be and are a factor in shaping the demand for American standards in electrical work. In the United States they have been accustomed to American station equipment and practice and when they take up engineering work in their home country they try to adhere to these standards.

Considerable space is given in the government report to the methods of selling goods in China so that those who are desirous of exporting to that country will be able to familiarize themselves with all the conditions and requirements necessary to give prompt and satisfactory service.

RECENT DEVELOPMENT OF MARIN WATER DISTRICT

BY H. M. BOWERS

(An attractive dam recently completed near San Francisco makes use of the siphon type of spillway. An interesting feature of the development is the restricted size of the watershed where a small area with very heavy rainfall provides the water supply for a populous district. The following description and construction data are contributed by the assistant engineer on the work, in charge of official detail, designing, detailing and estimating.—The Editor.)

The dam completed. The apron of the spillway is here clearly shown

A WATER supply development of considerable interest, which has just been completed, is that of the Marin Municipal Water District in Marin county, California. The district was organized in 1912 under an act of the legislature, usually called the Water District Act, which provided for the combination of small municipalities into an association to develop a common water supply system. The boundaries of the district are not identical with those of Marin county but take in the most thickly populated portions and include San Rafael, San Anselmo, Fairfax, Ross, Kentfield, Larkspur, Corte Madera, Belvedere, Mill Valley and Sausalito, as well as a considerable amount of adjacent territory.

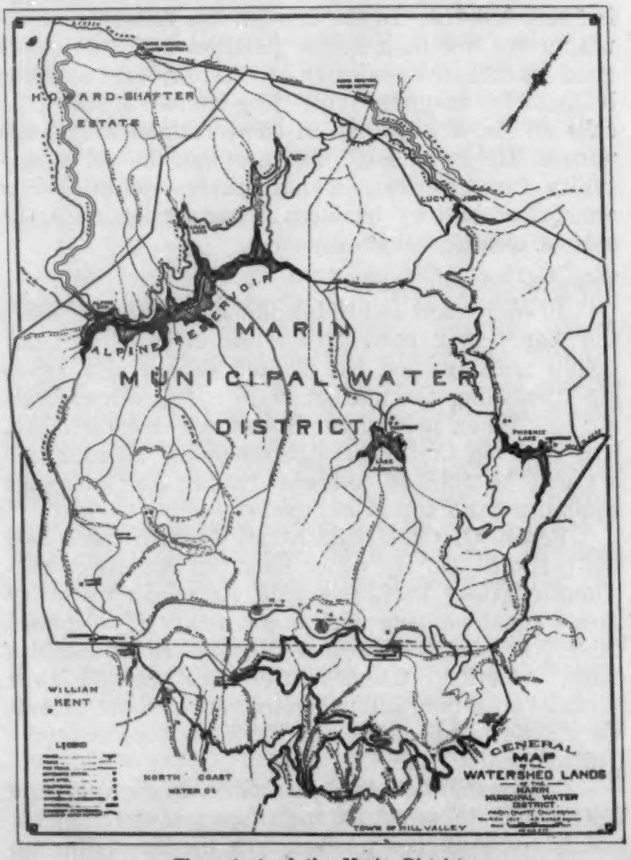
Necessity for Increased Storage

Before the district was organized these towns were supplied with water by a number of small companies acting independently of each other and which were taken over by the district. The principal ones of these companies were the Marin Water & Power Company and the North Coast Water Company. As soon as the district was formed Mr. A. R. Baker was employed, as engineer, to study the existing systems and the possible sources of supply, keeping in mind the probable needs of the community in the future as well as the needs of the present time. The existing companies were found to be able to supply somewhat more than 3,000,000 gallons per day and to have distributing systems which would approximately meet the immediate requirements and were susceptible of extension as occasion might require.

To increase the supply, more storage had to be developed. The Marin Water and Power Company had two small reservoirs—Lagunitas and Phoenix Lakes—but the capacities of these could not be much increased and Phoenix Lake had the disadvantage of an elevation such that the water from it had to be pumped. The Russian River was given consideration as a source of augmented supply but was soon rejected and the study was then confined to a comparison of the different ways in which the Lagunitas watershed could be developed. It was found that this watershed would provide for a daily draft of 15,000,000 gallons if fully developed and that such a draft would not be exceeded within the next 50 or 60 years. This would require a dam 170 feet high, a tunnel 1½ miles long and pipe lines sufficient to carry the water to the distributing system. Only

Upstream face of the dam,—showing the openings to the six siphons. The crest of the siphons is only 5 ft. below the crest of the dam, thus saving nearly all of the reservoir capacity.

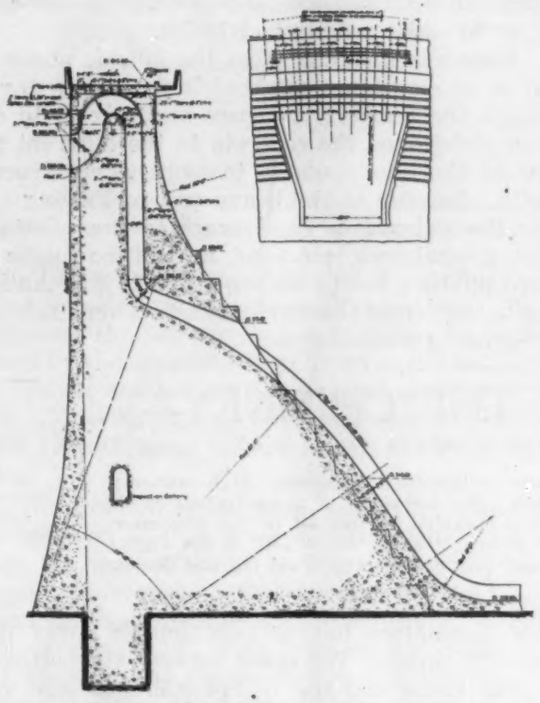
the tunnel, however, required immediate construction to its final dimensions, as the dam could be built to a lesser height at first, then increased later, and additional pipe lines could be added as needed.



The extent of the Marin District.

The Construction of the Dam

Of the three main features of the new work,—Alpine Dam, Pine Mountain Tunnel and the reinforced concrete pipe line—perhaps the one of greatest interest is Alpine dam. This is a dam of mass concrete, of the gravity type, and is curved in plan to an upstream radius of 465 feet. It has a height of 100 feet, a crest length of about 350 feet, and



A profile view which gives a clear idea of the nature of the siphons. The location of the inspection gallery and the upper finish of road and overhung sidewalk are also indicated.

contains 27,700 cubic yards of concrete. As nearly as was practicable, concrete of a mixture of 1:2½:5 was used in the cut-off trench, in the upstream face for a thickness of 5 feet, in the intake tower, spillway section and about the outlet and scour pipes through the dam. In the other parts a mixture of 1:3½:7 was used and the specifications permitted the use of large stones to such an extent as might be economical. As built, the dam contains some plum stones but their inclusion did not seem to be of much benefit from the standpoint of economy and the percentage of plums is small. For the upstream face of the dam 6 lb. of hydrated lime was used with each sack of cement.

The intake tower is semicircular in form. It is built against the upstream face of the dam and made monolithic with it. The tower is divided into two compartments by a concrete partition, one of the compartments being dry and containing the control valves. Water enters the tower through 18-inch circular sluice gates and cast iron pipes, passes through the gate valves and empties into the wet compartment, falling in this to the level of the outlet pipe through the base of the dam. There are three sets of sluice gates and gate valves arranged at different elevations so that water may always be drawn from near the surface of the lake and so that the gates may be operated under low pressure. A fourth set, placed at the bottom of the tower and discharging through a scour pipe, admit of draining the reservoir and wasting the water into the creek below the dam.

The Siphon and Spillway

A feature of Alpine Dam which may be of more than usual interest is the siphon spillway through the central portion of the dam. During the greater part of the year the discharge of Lagunitas Creek is small, but the watershed above the dam, with an area of a little more than ten square miles, is subject to extremely heavy rainfalls and stream measurements showed that to make the spillway entirely safe it would have to be designed to discharge a maximum of 4000 second-feet.

Since the reservoir is for storage purposes and since a small variation of the elevation of the water surface causes a relatively large variation in the quantity of water impounded, it was important to keep the crest of the spillway as high as might be practicable for the height of dam adapted. As the canyon banks rise steeply on both sides for long distances above the dam, thus affording no natural condition favorable for a spillway separated from the dam, it was necessary to provide one either through the body of the dam or around one end. A few computations and trial designs showed that the ordinary spillway of the overflow-weir type wound have to be so proportioned that it would sacrifice a large amount of the storage capacity of the reservoir, or else be very long. A long spillway through the body of the dam would have used so great a part of its length as to have nearly converted it into a dam of the overflow type. This it was desired to avoid. A further difficulty was that since the county road had to cross the dam such a spillway would have required a bridge along a large part of the length of the dam and added materially to the cost.

The method of conducting a large discharge around one end of the dam was also found to be an expensive one. The slope of the bank is about 35° and it would have been necessary to build a long overflow wall upstream nearly at right angles to the face of the dam and then to have excavated a channel in the steep hillside of such dimensions as would carry the water. Such an excavation would have been very heavy and expensive and might have required expensive protection against slides, which would have been most likely to occur at the time when the spillway would be most heavily taxed. Such a spillway would have to be bridged along its whole length to provide for the roadway.

The consideration of the siphon showed that six siphons, each $3 \times 7\frac{1}{2}$ feet in cross section, with downstream legs of such length as to utilize full atmospheric pressure, would readily discharge the quantity of water for which it was necessary to provide. The six siphons were located in the central portion of the dam with three feet of partition wall between adjacent ones, thus making the portion of

the dam affected by them only 60 feet in length. The siphons discharge between two guide walls running down the back of the dam, converging somewhat toward the lower toe and discharging the water into the bed of the creek at its lowest point. The crest of the siphons is only 5 feet below the crest of the dam, thus saving nearly all of the reservoir capacity. No difficulty was found in supporting the roadway over the siphons as the spans of 7½ feet were provided for by reinforcing steel bars, except at the thinnest portion in the crown, where three 18-in. I beams were embedded. Each siphon is provided with two air vents, 6 by 24 inches, leading from the face of the dam into the siphon chamber at the elevation of the siphon crest, thus causing the siphon to "make and break" automatically.

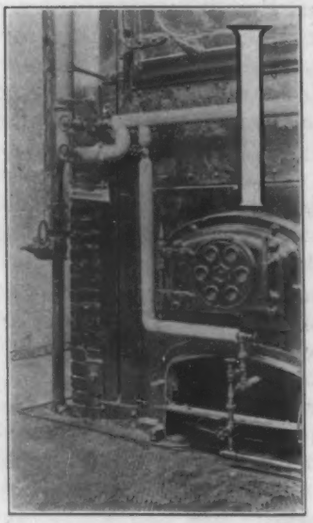
Other features of the dam are an upper inspection gallery 4 by 7 feet, inclined and lower galleries 3 by 6 feet, drainage wells spaced 10 feet apart, three contraction joints, grout holes and pipes. Two rows of staggered grout holes, the holes in each row being 15 feet apart, were drilled into the bed rock along the cut-off trench. From the tops of these holes iron pipes are led to the inspection galleries. No grouting of these holes was done during construction and because of the unusually good character of the foundation it is believed that none will ever be needed. But these holes provide a ready means of thoroughly grouting the foundation in case leakage under the dam shall ever occur in such quantity as to make grouting advisable.

Rock was quarried from the hillside above the dam at an elevation such that it passed by gravity through the bunkers, crushers and mixers to cars which distributed the concrete to the different portions of the dam from a temporary construction trestle. Because of the heavy cost of hauling sand from the railroad a sand machine was installed which ground rock into sand, a little too coarse for a good mixture, but by adding about 25% of Antioch sand to that from the sand machine a very satisfactory grading was obtained.

SAVING THE WASTE IN THE CHIMNEY---V.

BY ROBERT SIBLEY AND CHAS. H. DELANY

(Data from actual operating conditions devoid of the artificialities of special high economy tests are capable of usefulness difficult to overestimate. The following is a description of an actual operating test at one of the steam power plants operated by fuel oil in San Francisco and illustrates what may be done in the boiler itself toward "Saving the Waste in the Chimney." The article is by the authors of the recent book on "Elements of Fuel Oil and Steam Engineering."—The Editor.)



Boiler—oil fired—selected for test under operating conditions—Fig.1.

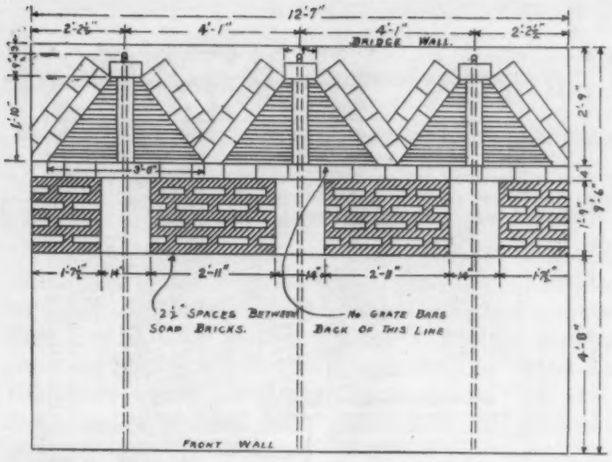
IN order to try and increase the efficiency and capacity of the boilers, certain changes were made on one of the boilers in one of the large power plants of San Francisco, as shown in Fig. 1. To determine what improvements had been effected a series of tests was run before and after the changes were made. This article includes a description of what was done to the boiler and tabulations showing readings taken during the test and the results derived from them. The amount of oil burned in the furnace was measured by a meter and the amounts of steam generated and steam used by the burners were measured by General Electric flow meters.

General Furnace Arrangement.—Before making the changes, the furnace in the boiler was arranged as shown in Fig. 2 and the baffles between the gas passages were located as shown in Fig. 4. Most of the baffle bricks in front of the flame plates between the 1st and 2nd passes were missing, thus allowing a large percentage of the gases from the furnace to pass directly into the 2nd pass, the flame plates themselves having been burned away in a number of places. The space between the bottom of the rear baffle and the bridge wall was also very small as shown on the sketch. This was remedied by moving back the bottom of the baffle to a position as shown in Fig. 5. All of the flame plates which were in bad shape were renewed and new bricks put in front of them, thus making the new baffles as tight as possible.

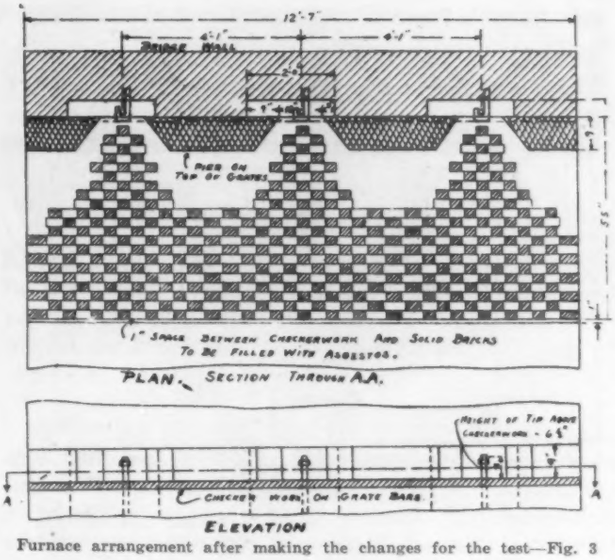
The furnace arrangement as shown in Fig. 2 was changed to conform to the arrangement as shown in Fig. 3. New grate bars having wide air spaces were also installed, a 2 ft. 6 in. bar being used next to the bridge wall and a 3 ft. 6 in. long bar next to this. These bars which are shown in Fig. 6 have a net free area of about 65%. The checkerwork and housings installed around the burners are shown in Fig. 7.

New piping was installed for the steam and oil to the burners. The general view of the piping and other details of the boiler front is shown in Fig. 1. The flanges inserted for bringing about an arrangement for limiting the steam to burners had a steel disc inserted between them, this disc having a 5/16 inch hole drilled through it. When the boiler is running at rating all the steam for atomizing passes through this hole, the lower valve on the by-pass around the disc being closed. When it is desired to carry a heavy load on the boiler the lower or by-pass valve is opened and enough steam can be obtained for any overload desired. The valves having rising stems, one can tell at a glance whether the by-pass valve is opened or closed.

The damper control was brought to the front



Furnace arrangement before making the changes for the test—Fig. 2


12'-7"
BRIDGE WALL
PIER ON TOP OF GRATES
1" SPACE BETWEEN CHECKERWORK AND SOLID BRICKS TO BE FILLED WITH ASBESTOS.
PLAN. SECTION THROUGH A.A.
CHECKER WORK ON GRATE BARS
ELEVATION

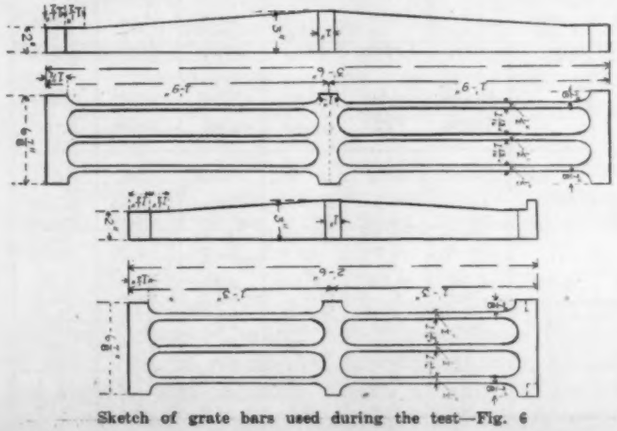
Furnace arrangement after making the changes for the test—Fig. 3

of the boiler and arranged so that the damper could be opened or closed in very small increments. It was found that the damper did not fit tight all around as proved by the draft readings taken in the boiler with the damper and ash pit doors closed as tight as possible. This defect was not completely remedied as there was still some leakage at this point during the tests.

The location of the peep hole in the south wall was changed so that a view of the front walls and tubes for some distance back from it could be obtained. This enabled the operator to see the end of the flame at all times and to determine when the fires were smoking. Peep holes were also put in the side walls close to the burners so that the flame and furnace could be observed at these points.

By building a small wall in front of the mud drum and laying a plate from the top of this wall to the mud drum, the possibility of gases getting under the drum and by-passing the 3rd pass was eliminated. A plate of 14 inches wide was laid on top of the upper tubes and against the back headers, the effect of this being to force the gases to pass over the entire tube surface in the rear pass.

Tables Showing Economy Data.—The following tables show the operating conditions and loads which could be carried on this boiler before and after the changes were made and the boiler cleaned. These tables show the average of the 15 minute readings during the periods for which the tests were run. In all cases the conditions remained practically constant during the run.



Sketch of grate bars used during the test—Fig. 6

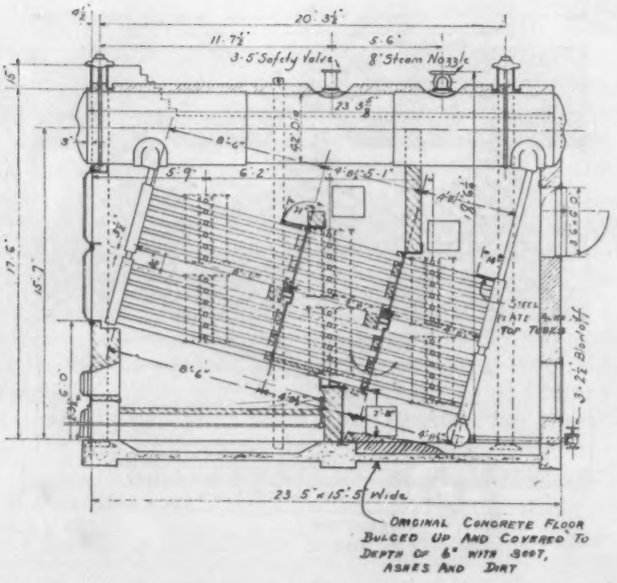
The first table shows the tests made on April 19, 20 and 21 before any changes had been made on the boiler, except that before the trials of April 20 the soot was blown from the tubes. This accounts for the much lower flue gas temperature for the first test on April 20 as compared with the evening test of April 19, at approximately the same load. The test of April 21 shows the maximum load which could be obtained on the boiler prior to the changes.

The fourth column in the second table shows the maximum load carried after the changes had been made. The following summary shows a comparison of the two maximum loads run:

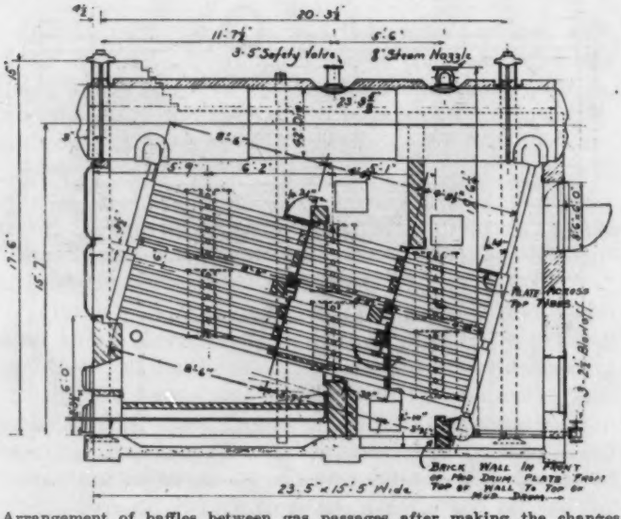
COMPARATIVE ECONOMIC RESULTS

	April 21 Before changes had been made	May 14 After changes had been made
Boiler pressure	196 lbs.	199 lbs.
Oil pressure	52 lbs.	55 lbs.
Oil temperature	177°	180°
Draft in breeching	.225"	.315"
" " top 3rd pass	.21 "	.271"
" " bot. " "	.21 "	.243"
" " " 2nd "	.155"	.171"
" " top " "	.039"	.066"
" " " 1st "	.016"	.042"
" " furnace	.083"	.096"
" " sh pit	.078"	.103"
Temp. of flue gases	610°	642°
Load on boiler	755 h.p.	972 h.p.
Per cent of rating developed	144%	186%
Gross efficiency	69.5%	76.4%
Steam to burners	4.28%	3.37%
Net efficiency	66.5%	73.82%

Conclusions from Test Data.—Thus the capacity of the boiler was increased from 144% of rating to 186% of rating, a net gain of 29% in the amount of steam generated. At the same time the net efficiency has been increased from 66.5% to 73.8%. This increase in net efficiency, it will be noted, has been helped out by the saving in the amount of steam for atomizing. The latter item having been reduced from 4.28% of the total steam generated to 3.37%. These efficiencies are only comparative as a heat balance shows that the efficiency is probably higher in each case than that given. The discrepancy is due probably to an error in the oil meter.



Arrangement of baffles between gas passages before making the changes for the test—Fig. 4



Arrangement of baffles between gas passages after making the changes for the test—Fig. 5

A comparison of the tests at other ratings shows a marked improvement in the operation of the boiler, particularly in the amount of steam for atomizing the oil. Subsequent to the tests enumerated it has been found that rating could be obtained on the boiler if the steam for atomizing was supplied through only a ¼ in. hole in the disc previously mentioned. Under this condition the steam for atomizing was reduced to slightly above 2%.

Checkerwork and housings installed around burners—Fig. 7

	ITEM NO.	DATE 1915		APRIL 19 2-4 P.M.	APRIL 19 7-7:45 P.M.	APRIL 20 10:24-11:00 A.M.	APRIL 20 3:20-4:20 P.M.	APRIL 20 3-4 P.M.	MAY 10 2:00-4:45 P.M.	MAY 11 2:05-4:45 P.M.	MAY 13 2:15-4:45 P.M.	MAY 14 7:40-8:45 P.M.
	1	DURATION OF TEST	HOURS	2	3/4	1 1/2	1	1	2	2	2	1
	2	AIR SPACE IN GRATE	SQ. FT.	←	482	SKETCH	No. 1	→	←	SEE SKETCH No. 2		→
	3	OIL BURNERS	NO. & MAKE	←	3	PEABODY	→	→	←	3 PEABODY		→
PRESSURES	4	BAROMETER	INS. MERCURY									
	5	STEAM GAUGE (SATURATED)	LBS.	196	197	197	196	196	198	202	197.6	199
	6	STEAM GAUGE (SUPERHEATED)	LBS.									
	7	STEAM PRESSURE AT BURNER	LBS.									
	8	OIL PRESSURE AT BURNER	LBS.									
	9	OIL PRESSURE ON LINE	LBS.	53	57	52	57	52	57	52	52	55
DRAFTS	10	DRAFT UNDER GRATE	INS. WATER	.10	.07	.107	.069	.078	.058	.046	.075	.108
	11	DRAFT IN FURNACE	INS. WATER	.096	.065	.103	.074	.083	.026	.017	.055	.096
	12	DRAFT IN TOP OF 1ST PASS	INS. WATER	.03	.00	.035	.00	.016	+ .025	+ .034	.00	.042
	13	DRAFT BEFORE DAMPER TOP OF 3RD PASS	INS. WATER	.19	.176	.195	.18	.21	.095	.055	.163	.221
	14	DRAFT AFTER DAMPER	INS. WATER	.205	.20	.204	.194	.225	.177	.19	.181	.315
TEMPERATURES	15	BOILER ROOM	DEGREES F.									
	16	FEED WATER	DEGREES F.	205	200	196	200	187	181	198	184	208
	17	SUPERHEATED STEAM	DEGREES F.									
	18	SATURATED STEAM	DEGREES F.	386	387	387	386	386				
	19	DEGREE OF SUPERHEAT	DEGREES F.	0	0	0	0	0				
	20	FURNACE	DEGREES F.									
	21	ESCAPING GASES	DEGREES F.	565	603	542	574	610	504	483	566	642
	22	FUEL OIL TO BURNERS	DEGREES F.	181	183	182	170	177	176	177	179	180
FUEL OIL	23	TOTAL FUEL OIL USED	LBS.				1720	1970	3260	3536	4100	2300
	24	GRAVITY OF FUEL OIL	DEGREES B.									
	25	PER CENT OF WATER IN FUEL OIL	%									
	26	HEATING VALUE OF FUEL OIL ~~FREE FROM WATER~~ B. T. U. PER LB.		ASSUMED			18500	18500	18500	18500	18500	18500
	27	TOTAL FUEL OIL USED FREE FROM WATER	LBS.									
	28	FUEL OIL PER HOUR AS FIRED	LBS.				1720	1970	1630	1418	2050	2300
	29	FUEL OIL PER HOUR FREE FROM WATER	LBS.									
WATER	30	TOTAL WATER USED	LBS.									
	31	FACTOR OF EVAPORATION		1.053	1.06	1.062	1.06	1.07	1.08	1.065	1.08	1.06
	32	TOTAL WATER EVAPORATED FROM & AT 212° F.	LBS.									
	33	ACTUAL WATER EVAPORATED PER HOUR	LBS.	18960	20500	20600	22710	24340	20280	17300	24010	24600
	34	WATER EVAPORATED PER HOUR FROM & AT 212° F.	LBS.	19960	21730	21880	24070	26050	21900	18430	28100	33490
EFFICIENCY	35	WATER EVAPORATED PER LB. OF OIL AS FIRED	LBS.				13.2	13.33	12.44	12.2	13.7	13.72
	36	WATER EVAPORATED FROM & AT 212° F. PER LB. OF OIL AS FIRED	lbs.				14.0	13.20	13.44	13.0	13.7	14.55
	37	Water Evaporated from & at 212° F. per Lb. of Oil Free from Water	lbs.				—	—				
	38	PER CENT OF TOTAL STEAM USED BY BURNERS	%	4.4	5.17	4.04	3.75	4.28	3.15	3.06	3.12	3.37
	39	GROSS EFFICIENCY	%				73.7	69.5	70.5	68.1	71.9	76.4
	40	NET EFFICIENCY (DEDUCTING STEAM USED BY BURNERS)	%				71.0	66.5	68.3	66.02	69.3	73.82
HORSE POWER	41	STANDARD COMMERCIAL HORSEPOWER DEVELOPED	H. P.	580	630	635	700	755	635	528	815	972
	42	BUILDERS' RATING	H. P.	524	524	524	524	524	524	524	524	524
	43	PER CENT HORSEPOWER DEVELOPED OF RATING	%	111	120	121	134	144	121	101	156	186
FLUE GASES	44	CARBON DIOXIDE TOP OF 1ST PASS	CO_2 VOLUME IN %	15.0	15.6	14.8	15.4	15.0	15.1	14.5	15.6	14.9
	45	OXYGEN " " " "	O VOLUME IN %	0.2	0.5	0.1	0.8	0.2	1.3	3.0	0.5	0.0
	46	CARBON MONOXIDE " " " "	CO VOLUME IN %	0.8	0.6	0.8	0.0	0.8	0.1	0.0	0.1	1.3

SPARKS—Current Facts, Figures and Fancy

(A doctor's consultation by wireless, a new motor of small dimensions, a series of experiments on the absorption of heat by colors and various items of war interest in their after-the-war significance.—The Editor.)

An antiquated law in Minnesota makes it possible to raise not more than one mill on the assessed valuation of the state for building roads and bridges. This means that not more than $1,600,000 can be spent in that state for road work during 1919—for the state constitution further prohibits the state from incurring any debt whatsoever for works of internal improvement.

* * *

Among the directions issued by the London Safety First Council for the benefit of pedestrians during the periods of darkness imposed by Zeppelin raids was one to the effect that a white handkerchief should be held out when crossing the road, to attract drivers' attention and to indicate your whereabouts. There is many a dimly lit corner on country roads where this practice might find permanent application.

* * *

The wireless telephone and the wireless telegraph were used in mid-ocean recently by a doctor on one transport to prescribe for patients on another which was many miles away. While the two transports were fifteen miles apart at a point about 500 miles north of the Azores, the wireless telephone was used for a consultation of the doctors on board. Six doctors each put on a telephone set and "attended" the consultation.

* * *

The difficulties of inland transportation in China made it necessary to specially design the parts of three wireless stations to be installed at Kasgar, Urumchi and Lanchow-fu so that the heaviest piece would not exceed 300 lbs. The stations, when completed, will far exceed the power and range of transmission of any other station in China and as a purely commercial telegraph circuit overland will exceed in length any other in the world.

* * *

An electric motor of extremely small dimensions has appeared on the market. It is enclosed in a shell of 3 cm. diameter and 4 cm. length and weighs 150 gm. The shaft is arranged so as to hold tools that are required by dentists and surgeons, but the device should be of great use for other purposes—such as boring small holes in metals and rare stones. The motor can be driven by direct or alternating current, and runs at a maximum speed of 5,000 r.p.m.

* * *

The Western Electric Company's factory in Antwerp is soon to be in running order again, thanks to the foresight of one of the officials who buried the records and valuable papers so skilfully under the floor that the Germans could not locate their hiding place. Foreseeing that the machinery would be carried off, he procured a list of the equipment and at the time he was forced to leave Antwerp, placed an order for its duplication at the close of the war.

* * *

Feeding the cattle on paper may become common practice. Paper made of leaves was a war measure in France and was so successful that it is likely to be continued as a regular product. The discoverer of this new material claims that it has a number of uses in addition to its use as a paper material. First, it has a high food value, since it contains the digestible parts of the leaves with the cellulose removed. Then it can be used as fuel. Compressed into cakes it may be used either with or without charcoal.

* * *

The shortage of tin was so acute in Germany during the war that as early as January, 1917, an order was issued confiscating all organ pieces made of tin. By this proclamation churches, clubs, hospitals, prisons, universities, concert halls, etc., which possessed organs, as well as makers of organs and dealers—were required to deliver their tin pipes to indicated collecting stations. Exception was made only in the case of articles declared by duly authorized experts to have special intrinsic or historical art value.

* * *

Coblenz saw its first electric Christmas tree on Christmas Eve. It was set up in the plaza along the Rhine, directly in front of the headquarters of the Third Army. The tree, which was 40 ft. high, was decorated with red, white and blue ribbons and was trimmed by army nurses. It was placed in position by members of the Thirty-seventh Engineers. Red, white, and blue incandescent lights covered the tree, at the base of which, in letters 3 ft. high, were the insignia of the Third Army. The electricity was furnished by a portable plant taken to the spot by American troops.

* * *

Experimental temperature observations were made recently at Balboa Heights to determine roughly the comparative heat absorbing properties of various colors exposed to the sun's rays. The red gave readings approximately half way between the white and the black, and a thermometer bulb covered with navy blue bunting gave approximately the same temperature readings as the black. It would seem that the maximum heating of corrugated iron roofing on dwelling houses in the Canal Zone might be reduced approximately 10 degrees Fahrenheit by painting these roofs red instead of black, or reduced 20 degrees Fahrenheit by painting the roofs white.

PERSONALS

Lars R. Jorgensen, a consulting electrical and hydraulic engineer of San Francisco, has been awarded the Norman medal for the year 1918. The medal is each year awarded by the American Society of Civil Engineers for the best paper submitted to the Society during the current year. Mr. Jorgensen's paper was entitled "Multiple-Arch Dams on Rush Creek, California." Readers of the Journal of Electricity are familiar with this excellent work of Mr. Jorgensen as he has during recent months contributed a number of interesting papers to its columns along the same discussion. Mr. Jorgensen is now under nomination as a vice-president of the American Institute of Electrical Engineers and the best wishes of engineers of the West go with him in his continued rise in the engineering profession.

E. H. Eardley and W. G. Bruce of Eardley Bros., Salt Lake City, are recent San Francisco visitors and later visitors at San Diego.

W. J. Davis, Jr., Pacific Coast engineer for the General Electric Company, with headquarters at San Francisco, has returned to his home office after an extended visit to New York City.

Lee Hagood, an electrical engineer, representative of the General Electric Company at Petrograd, Russia, has recently arrived in America and is stopping at the Mohawk Club, Schenectady, New York.

Manly C. Turpin, assistant to the manager of publicity for the Westinghouse Electric & Manufacturing Company, is making an extended visit on the Pacific Coast visiting manufacturing, industrial and agricultural centers.

E. Zimmerman, with the Pacific Gas & Electric Company until he entered army service, has recently returned and is now on the sales force of the Pacific States Electric Company in San Francisco, specializing on lighting equipment.

Captain Guy Barker, formerly with the distribution department of the Pacific Gas & Electric Company, has returned from France to his home in San Francisco. In the service Mr. Barker was engaged in the Coast Artillery branch.

Chuzo Mori, an electrical engineer in the department of communication of Japan, who has in charge the issuance of water right permits in Japan, is a Pacific Coast visitor and is now visiting many power installations in the southern district of California.

Harold G. Baugh, recently on the electrical engineering staff of the Union Iron Works, and formerly in the distribution department of the Pacific Gas & Electric Company at San Francisco, has moved to Petaluma, where he will be connected with the firm of his brother, known as Bauer and Baugh.

Colonel H. M. Byllesby has been elected president of the Chicago branch of the National Security League, succeeding H. H. Merrick. Colonel Byllesby is scheduled to give the leading talk at the grand banquet of the Pacific Coast Section, N. E. L. A., to be held at Coronado Hotel, California, May 2, 1919.

George H. Hagar, recently a captain in the U. S. Heavy Artillery, is now chief engineer of the Vallejo Electric Light & Power Company. Mr. Hagar is making a change over in the distribution system from 2-phase, 2400 volts to 3-phase, 4000 volts. The company purchases its power from the Pacific Gas & Electric Company.

Charles C. Parlin, manager of commercial research for the Curtis Publishing Company of Philadelphia, is a recent Pacific Coast visitor. While in San Francisco Mr. Parlin gave an interesting talk on electrical commercial research matters before the recent San Francisco dinner of the California Electrical Cooperative Campaign.

Paul Lincoln, commercial engineer for the Westinghouse Electric & Manufacturing Company, with headquarters at East Pittsburgh, is a recent Pacific Coast visitor. Mr. Lincoln is a past president of the American Institute of Electrical Engineers and is in addition to filling a crowded business program, attending a number of western sections of the Institute.

Elgin Stoddard, vice-president of Chas. C. Moore & Company, engineers, has returned to San Francisco from a trip to New York City in time to lead in the activities of the San Francisco Section of A. S. M. E. given in honor of Calvin A. Rice, secretary of the society. Mr. Stoddard is acting chairman of the local section in absence of E. C. Jones of the Pacific Gas & Electric Company, who is confined to his home on account of illness.

E. R. Hessling and C. H. R. Arntzenius, Dutch telephone experts, are in this country on a transcontinental trip to investigate American telephone systems. They are strong advocates of the automatic telephone which obtains extensively in Holland. They state the Hague, with 400,000 population, has but 12,000 telephones, while Salt Lake City, Utah, with 125,000 population, has 25,000. The Dutch government is acquiring all the telephone systems in Holland.

C. M. Gifford, the newly appointed Pacific Coast manager of the H. W. McCandless & Company, with headquarters in San Francisco, comes to his new position with long acquaintance in matters electrical. Back in the busy days of the Panama Canal excavation he was in Y. M. C. A. work and had close association with General Goethals in connection with those endeavors. For the past four years he has been closely engaged in various departments of the lamp company of which he is now Pacific Coast manager. Though but a novice of four months in golfing, Mr. Gifford's former wide experience in athletics has enabled him to progress unusually rapidly. At the recent Del Monte meeting of Electrical Jobbers his score was 96, while upon the California Course in San Francisco on Washington's Birthday the San Francisco Chronicle had the following to say: "In sweepstakes competition at the California Golf Club the winner was C. M. Gifford. Gifford turned in a card of 93. That, less his handicap of 22, gave him a 71 for the course. The three winners out of 25 entries:

	Gross	Hdcp.	Net
C. N. Gifford	93	22	71
W. F. Stewart	84	10	74
Ben Golcher	85	10	75
Geoffrey Almy	96	16	80
Ernest Munton	98	17	81
F. D. Atherton	92	12	80
A. L. Speetzen	87	10	77
R. B. Woolcot	99	20	79
G. K. Fish	98	16	82
W. D. McNicoll	90	12	78
C. D. Rand	101	20	81

Calvin A. Rice, secretary of the American Society of Mechanical Engineers, with headquarters in New York City, has passed on through Los Angeles and San Francisco to the business centers of the northwest. While in California Mr. Rice's presence has proven unusually helpful. Not only have the interests of his own society been forwarded by the broad way in which he has assisted in the solution of a very delicate professional problem in the West but his presence here has also been helpful in aiding engineers as a body in seeing the greater service ahead in which engineers may prove of vital assistance in discussing and solving present-day problems before the citizenship at large.

G. L. Oman, northwestern manager of the Pacific States Electric Company, has been a recent Seattle visitor.

F. E. Johnson, Jr., vice-president of the M. W. Kellogg Company of Jersey City, is a recent San Francisco visitor.

H. A. Joslin, manager of the Dallas, Ore., division of the Mountain States Power Company, has been reelected vice-president of the Dallas Chamber of Commerce.

Baron Shimpei Goto, former Minister of Communications of Japan, accompanied by his son, a Columbia University student, and party, arrived in San Francisco recently from the Orient.

W. H. Whiteside, who has for many years past been connected with the Westinghouse Electric & Manufacturing Company in the capacity of a vice-president, is a recent San Francisco visitor.

W. G. Swendsen, formerly of Pocatello, who has done the engineering work for the Idaho public utilities commission, has recently been appointed state engineer of Idaho to succeed F. A. Wilkie.

J. G. De Remer, a consulting engineer of New York City, formerly with the United Light & Power Company of San Francisco, has opened consulting engineering offices in the Rialto Building in San Francisco.

Oscar G. Goldman, formerly first lieutenant in the water supply division of the U. S. Army, is back from France and again in his work with the engineering staff of the Spring Valley Water Company in San Francisco.

C. B. Merrick, field representative of the Journal of Electricity, has returned to San Francisco after an absence of nearly three months, in which time he visited practically all electrical centers throughout the northwest inter-mountain districts.

Capt. Chas. Grunsky, formerly connected on valuation work with the California Railroad Commission and now captain of engineers with the 5th Engineers, has recently returned from France and is visiting the Pacific Coast on leave, his regiment being stationed in Virginia.

J. W. Oberender, who for some years has acted on part time as the efficient secretary of the Oregon Association of Contractors and Dealers, has recently been employed by that organization to give his entire time to the work. The Association has also fitted up new offices in the McKay Building, Portland, and looks forward to greatly increased effectiveness within the next few months.

Milton Kraemer, a consulting engineer of San Francisco, who during the war period was in the service of the Federal Fuel Administration in the capacity of combustion engineer, has established the Unit Engineering Company in San Francisco to undertake problems of power efficiency. He has recently published a copyrighted pamphlet on the subject of superheaters and superheating that should prove helpful to those engaged in steam power generation.

Guy C. Pierce, recently affiliated with R. C. Gillis in water power interests in Los Angeles, has accepted the position of vice-president and general manager of the Northwestern Electric Company to succeed W. E. Coman, who recently resigned to occupy a similar position with the Washington Power Company at Spokane. Mr. Pierce has a long experience to fit him for the post. Beginning in Sacramento in 1887 he went to San Francisco, where later he was general manager of the Edison Company. More recently he had been connected with hydroelectric development on the Pacific Coast.

Y. Matsunaga, M. P., Tokyo, Japan, president Hakata Chamber of Commerce; **Masayuki Naruse,** Tokyo, Japan, president, Seiko & Company; and **Ryomin Inouye, M.A.** (Yale), of Tokyo, Japan, passed through San Francisco and Los Angeles recently on their way East enroute to Europe. Mr. Matsunaga, besides his activities in political affairs, is the managing director of the Kyushu Electric Light & Traction Company, which system operates quite extensively in the southern part of Japan. Mr. Naruse is also interested with Mr. Matsunaga in the same company. It is understood that Mr. Inouye is acting as private secretary to Mr. Matsunaga.

George G. Anderson and **Wilfred Barnard,** two consulting engineers of Los Angeles representing the Joint Engineering Council in the Los Angeles district, made a visit to San Francisco recently at the invitation of the Joint Engineering Council of San Francisco, in order to discuss the engineers' license bill up before the California legislature. The meeting in San Francisco was well-attended and after prolonged discussion it was decided to withdraw the bill. It is believed that a great good has resulted in that engineers the state over have come to a working understanding in the matter and that a most cordial feeling will exist in all future consideration of the subject.

Personals of Trade Interest

Paul A. Shilton, Los Angeles representative of R. J. Davis, District Sales Agent for Century A.C. Motors and Fans, is visiting the dealers in Arizona.

R. M. Cole, formerly with Thompson & Castleton, electrical engineers of Seattle, is now with the Seattle office of the Economy Fuse Manufacturing Company.

George K. Heyer is the new assistant telephone sales manager of the Western Electric Company, having been advanced from the position of railway sales engineer.

A. H. Kahn, general purchasing agent for the Pacific States Electric Company with headquarters at San Francisco, recently visited the Seattle and other northwestern houses of the company.

Mailler Searles, western representative of manufacturers of merchandizing-handling equipment, including electric industrial trucks, has moved his offices from the Monadnock Building to the Rialto Building, San Francisco.

E. V. Adams succeeds G. K. Heyer as railway sales engineer of the Western Electric Company. Mr. Adams was formerly stationed in the West and Middle West, but in 1913 went to New York where his headquarters will remain.

C. R. Hunt, of Robbins & Myers, with headquarters in San Francisco, is leaving for a trip through Utah, Idaho, Washington and Oregon. He expects to meet at Salt Lake City **W. W. Mumma,** sales manager of his company, and both will attend the big convention at Coronado, April 30-May 2, 1919.

Joseph L. Jaffe, secretary and sales manager of the Perfeclite Company, Seattle, recently returned from California after placing agencies and has departed for New York and other eastern cities in connection with the rapid expansion of the Perfeclite lighting fixture business. He will place agencies in a number of the larger eastern cities.

MEETING NOTICES FOR ELECTRICAL MEN

(Meetings of especial interest are reported from the local centers during the past two weeks period. Convention plans for the Vancouver meetings of May 26 and 27 and the big Coronado Convention of April 28 to May 2 are well in hand—and representative gatherings are expected at each.—The Editor.)

The San Francisco Dinner of the California Electrical Cooperative Campaign

Attended by a notable gathering of men, the dinner of the California Electrical Cooperative Campaign, which was held at the San Francisco Commercial Club rooms Thursday evening, March 13, 1919, proved an unqualified success. Nearly three hundred and fifty seats by actual count were found to be occupied during the evening, which number far exceeded the fondest expectations of those having the affair in charge.

The keynote of the evening was struck by Chas. C. Parlin, manager of commercial research for the Curtis Publishing Company, when as an advertising man interested in effective advertising, he emphasized the necessity of local men tying-in with national advertising to accomplish the best results.

In detail the program for the evening was as follows:

Samuel Kahn, President—"Pacific Coast Section N. E. L. A."
G. E. Arbogast—"The Cooperative Campaign."
C. N. Banta, Wells Fargo Nevada National Bank—"How Cooperation Affects Credits, Collections and Finances."
Chas. C. Parlin, Manager Division of Commercial Research, Curtis Publishing Co.—"Market Opportunities of Electrical Distributors."

At the speakers' table were: A. W. Childs, assistant general agent of the Southern California Edison Company and chairman of the commercial committee of the Pacific Coast Section N. E. L. A.; C. N. Banta, Wells Fargo Nevada National Bank, San Francisco; G. E. Arbogast, vice-president California Association of Electrical Contractors and Dealers; Chas. C. Parlin, manager commercial research, Curtis Publishing Company; L. H. Newbert, manager commercial department, Pacific Gas and Electric Company, and chairman advisory committee, California Electrical Cooperative Campaign; Samuel H. Kahn, manager Western States Gas & Electric Company and president Pacific Coast Section N. E. L. A.; R. S. M. Boyce, local manager Curtis Publishing Company; W. S. Berry, western sales-manager Western Electric Company, and K. E. Van Kuran, Los Angeles manager Westinghouse Electric & Manufacturing Company. Great credit is due Leon Van Atta of the Pacific States Electric Company and F. E. Boyd of the General Electric Company, who acted as chairman and treasurer, respectively, of a Boosters' Committee formed just a week prior to the event to make the meeting a success.

C. N. Banta of the Wells Fargo Nevada National Bank opened up new ideals of helpfulness in cooperative effort and showed in a most convincing manner how cooperation very materially affects credits, collections and finances of every branch of the industry.

Chas. C. Parlin, of the Curtis Publishing Company, gave a most interesting lecture setting forth the splendid part the electrical industry will play in years immediately ahead. In conclusion he most emphatically brought out the truth that while advertising prepares a field that should stimulate work in an industry, it is only by the cooperative effort of all concerned that the highest and best results may be obtained.

Thus closed one of the most notable and helpful dinners thus far undertaken by the California Electrical Cooperative Campaign.

Oregon Association of Electrical Contractors and Dealers

Several matters of importance have come up at recent meetings of the Portland local branch of the Oregon Association of Electrical Contractors and Dealers. The question of dues was considered at the meeting of Feb. 24th and finally fixed at the next meeting, dues hereafter to be retroactive as of Jan. 1, 1919, as follows: Class A members, $7.50 per month, Class B members, $10 per month, Class C members, $12.50 per month, Class D members, $20 per month, Class E members, $30 per month, to be payable either monthly or quarterly, in advance.

A financial report showing income and expenditures with a balance of $696.57 was presented and accepted. The association heard a report on the Own Your Own Home Bureau and the matter of submitting estimates of costs for the use of the Bureau and determined upon cooperation with this organization.

Mr. Larsen reported attending a meeting at the fire marshal's office in reference to the installation of fire alarm systems and reported that it was the sense of the meeting that some specifications covering this work were needed, as the inspectors were finding many installations not installed properly. A committee was appointed with F. A. Bauman, chairman, who reported at the next meeting, making recommendations of specifications for the installation of fire gongs which were adopted with slight changes.

At the March 10th meeting it was decided on the recommendation of the State of the Association committee to retain the secretary at full time and furnish necessary office equipment and help, with a view to increasing the value of the society to its membership. This plan is to be given a three months' trial.

Vancouver Convention

Plans for the May 26th and 27th convention of the Vancouver Association of Electrical Contractors and Dealers are fast taking shape and a large attendance is expected. The

BUILDERS OF THE WEST—L.

FRANKLIN K. LANE

Seldom in the arena of human affairs do we witness a public servant act with the wisdom, with the devotion, with the consecrated idealism, such as instanced time and again by Franklin K. Lane, Secretary of the Interior. As a product of the West, devoted to the development of the native values of our great nation, he has few equals. This issue of the Journal of Electricity is affectionately dedicated to Franklin K. Lane, as a lasting memorial to his kindly and loving service in a public life well worthy of emulation.

following names are among the preliminary list of those who are being urged to attend. All those interested in electrical matters on the Pacific Coast are cordially invited to this gathering.

Sam Pugh, Chilliwack, B. C.
W. S. Robinson, Duncan, B. C.
W. K. Manley, Grand Forks, B. C.
Miller & Gradner, Grand Forks, B. C.
Marsh Bros., Kamloops, B. C.
J. E. Trenwith, Kelowna, B. C.
Taylor Electric Co., Ladner, B. C.
C. F. Bryant, Nanaimo, B. C.
W. H. Morton, Nanaimo, B. C.
J. H. Matheson, Nelson, B. C.
Penticton Electric Co., Penticton, B. C.
Mattie & Handforth, Prince George, B. C.
Parkin & Ward, Prince Rupert, B. C.
F. N. MacDonald, Princeton, B. C.
Prince Rupert Engineering Company, Prince Rupert, B. C.
T. P. Thornber, Summerland, B. C.
J. M. Edgar, Vernon, B. C.
F. J. Evans (V. I. F. Lands), Vernon, B. C.
T. C. Duncan, Elec. Supt., Prince Rupert, B. C.
H. A. Carney, City Clerk, Prince George, B. C.
H. A. Morrison, City Clerk, Ladysmith, B. C.
H. A. Garrard, Elec. Supt., Duncan,
A. S. Fraser, Elec. Supt., Kamloops
W. E. Dickey, Elec. Supt., Revelstoke
G. A. McNaughton, Elec. Supt., Armstrong
H. A. Blakeborough, Elec. Supt., Vernon, B. C.
G. H. Dunn, City Clerk, Kelowna
F. S. McKeever, Elec. Supt., Penticton
R. F. Blandy, City Clerk, Port Alberni
J. Shortt, Mgr. Cumberland Light Co., Cumberland, B. C.
C. S. Wood, Mgr. Lighting Dept., Courtenay, B. C.
W. Lewis, Mgr. Nanaimo Electric Light Co., Nanaimo, B. C.
C. L. Wain, Elec. Contr., Kamloops
H. P. Thomas, City Clerk, Electrician, Kamloops

Coronado Conventions

With the Coronado conventions of the N. E. L. A., Pacific Division Electrical Supply Jobbers' Association and the California Association of Electrical Contractors and Dealers less than a month off, definite plans for attending

On the piazza at the Coronado

the convention are already being made. A large delegation from the San Francisco region is expected and arrangements for transportation have been made to meet every one's convenience. The S. S. "Governor" or the S. S. "President" will leave Pier No. 18, foot of Howard street, San Francisco, at 12 noon, Monday, April 28th, and arrive at Wilmington at 12 noon, Tuesday, remaining there until 10:30 a.m. Wednesday, when it will sail for San Diego, arriving at 4:30 p.m. Wednesday. As this steamer reaches San Diego too late to permit of attendance at the opening meeting of the convention scheduled for Wednesday afternoon, it is recommended that delegates leave the boat at Wilmington and take the train to Los Angeles and from there to San Diego, arriving at 9:30 p.m. Tuesday.

No special rates are permitted on the railroad, owing to heavy traffic in connection with the demobilization of troops, and no reservations of Pullman space can be made. That is, it is advisable to purchase both tickets and Pullman space at the earliest possible moment.

Many members are planning to make the trip by automobile and special features of interest are planned as part of the trip. A limited number of automobiles may be carried on the boat if arrangements are made in time. Anyone wishing further information should communicate with the Master of Transportation, W. M. Deming, Gen'l Mgr., Journal of Electricity.

The schedule of papers is now definite as given below. These papers will appear in full in the next issue of the Journal of Electricity.

Engineering Committee Papers —
"Use of Pulverized Coal from the California Coal Fields," by Chas. H. Delany.
"The Emergency Interchange of Power," by G. R. Kenny.
"San Joaquin Induction Generator Plants," by E. A. Quinn.
"Relay Protection Systems," by G. E. Armstrong.
"Converting a Steam Plant to Stand-by Operation," by L. M. Klauber.
"Increasing the Revenue by the Use of a Straight Line Watthour Meter," by Otto A. Knopp.
"The Electric Welding Load," by John Hood.
"Kilowatt Hours per Barrels of Oil," by S. J. Lisberger.
Report of the Insulator Committee, by J. A. Koontz.

Commercial Committee Reports —
"Selling the Idea," by H. L. Harper.
"The Contractor-Dealer of Tomorrow," by John C. Rendler.
"Progress of Electric Cooking and Heating," by Ben M. Maddox.
"The Proper Training of the Sales Personnel," by Lee H. Newbert.
"How Can the Electrical Industry Assist the Architect in Serving His Clients?" by J. O. Case.
"Appliance Sales Policies," by T. W. Simpson.

Journal of Electricity Endorsed at Portland Joint Meeting

The regular monthly meeting of the Portland Section of the N. E. L. A. and A. I. E. E. was held on Feb. 4, 1919. Chairman Boykin of the A. I. E. E. had charge of the meeting and announced that Major Zinn of the U. S. Engineers would present a paper at the March meeting of the Associations, and that the United States representative inspecting concrete hulls would present a paper at the April meeting describing the method of constructing these hulls as carried on at the concrete shipyard located at Vancouver, Washington. Announcement was also made of the decision of the two associations to assist in increasing the subscribers to the Journal of Electricity, which is the western representative of this line of publications and which deserves support from the engineers of the West. A special inducement was offered to anyone who wished to subscribe to this journal through the secretary of the association. Announcement was also made of a special rate for local membership in the joint associations, together with a year's subscription to the Journal of Electricity. Following these preliminary announcements the speaker of the evening was introduced.

Mr. H. J. Shepard, from the Seattle office of the Pacific Telephone and Telegraph Company, described in a very entertaining manner the laying of about 18,000 feet of submarine telephone cable across an arm of Puget Sound. This is a portion of a telephone connection between Seattle and Bremerton which constitutes about a 15-mile line, 5 miles of which are submarine. The cable described in the paper forms approximately .6 of this total submarine distance and is laid marine telephone cable across an arm of Puget Sound. Details of the talk will be given in the next issue of the Journal of Electricity.

The speaker showed the principal features of this work by means of lantern slides during his talk and followed by illustrating still further by means of a moving picture film taken during the actual operation of laying the cable. This was a very entertaining and instructive meeting to all who were fortunate enough to attend. There were 55 present.

The meeting was held in the Library Hall at 10th and Yamhill streets and the entertainment committee provided the audience with fine Hood River apples following the lively discussion of the paper.

American Welding Society

After a preliminary meeting for organization purposes, the American Welding Society formally held its first meeting on Friday, March 28, 1919, at the Engineering Societies Bldg., New York.

It is the purpose of the society to become a disinterested and dependable source of information on welding, not only

for the benefit of the manufacturers of welding apparatus and supplies, but also to aid those who use welding in their production and those who purchase welded goods. All those interested in welding are eligible to join and if they will send in their names to the Journal of Electricity or to F. A. Anderson of the U. S. Shipping Board of San Francisco, they will be put in touch with the new organization.

Electrical Supply Jobbers

Interesting meetings were held during March by the Central and Atlantic Divisions of the Electrical Supply Jobbers' Association. Of particular interest was the discussion which developed at the Chicago meeting in reference to carrying expense of salesmen, stenographers and typists, operating expenses and overhead. The need of establishing similar figures of a concrete nature to serve as a basis for studying economies of distribution was brought out. These are to be secured and will be a feature of the summer convention during June.

W. R. Herstein of the Electric Supply Company of Memphis, Tenn., was elected chairman of the Central Division.

New Mexico Convention

A most successful convention was held by the New Mexico Electrical Association at Albuquerque during February. Among the papers were:—

"Industrial Lighting"— by W. C. Wurfel, Pacific Coast manager of the Westinghouse Lamp Company.

"Relations of Consulting Engineer to Public Utilities"—by H. O. Duerr, consulting engineer of Albuquerque.

"Efficiency"—by M. R. Buchanan, manager of the Silver City Power and Ice Company.

"Some Considerations in the Use of Iron Wire for Alternating Current Transmission"—by Prof. R. W. Goddard of the New Mexico College of Agriculture and Mechanical Arts.

"High Voltage Pin Type Insulators"—by H. L. Garbutt, manager of the line material section of the Westinghouse Electric & Manufacturing Company of East Pittsburgh.

"Power Factor"—by B. C. J. Wheatlake of the General Electric Company, Denver, Col.

"Prospects for the Year 1919"—by W. P. Southard, manager of the Trinidad Electric Transmission Railway & Gas Company, Trinidad, Col.

"Marketing Condition of Materials Used Principally in Central Stations"—by A. C. Cornell, sales manager of the Western Electric Company of Denver.

"The Relation of the Manufacturer to the Utilities"—by C. D. Le Moree, Westinghouse Electric & Manufacturing Company of Los Angeles, Cal.

"Electrical Merchandising"—by D. W. Morgan, manager of the Las Cruces Light & Power Company.

"What the Electrical Association Means to Its Members"—by M. E. De France, manager of the Deming Ice & Electric Company.

"Knowledge that Pays Dividends"—by J. D. Clark, professor of chemistry at the University of New Mexico.

WESTERN MEETINGS

A. I. E. E., Seattle Section —

March 29.—John B. Fisken—"The Engineer, His Opportunities and His Duties"; Paul M. Lincoln—"The History of Electric Power Transmission."

A. I. E. E., Spokane Section —

March 21.—C. D. Dolman, chief chemist Northwest Magnesite Co., Chewelah—"Magnesite, Its Geology, Products and Their Uses."

A. I. E. E., San Francisco Section —

March 28.—W. F. Dietrich—"Mountain Railroad Electrification in California." Extracts from Mr. Dietrich's report were published in the Journal of Electricity several months ago and members were therefore familiar with the proposition and ready to enter into discussion.

Associated Engineering Societies and the Engineer's Club, Seattle —

March 22.—Geo. F. Nicholson, chief engineer of the port of Seattle—"Port of Seattle Problems" and motion pictures of "Seaboard Coaling Stations Along the Atlantic Coast."

Oregon Society of Engineers —

March 21.—Special entertainment meeting for architects and engineers. Discussion of the compensation of engineers.

Engineers' Club of San Francisco —

March 21.—Lieut. Chas. F. Roth—"Development of Industry by Chemical Engineering" and the Influence of the Annual National Exposition of Chemical Industries.

Telephone and Telegraph Society of the Pacific Coast—San Francisco Section —

March 27.—Lieut. Col. A. H. Griswold—"Signal Corps Work with the American Expeditionary Forces."

American Chemical Society—California Section —

March 14.—Capt. W. E. Brophy, C. W. S., U. S. A.,—"Gas Defense Chemicals."

Pacific Service Employes' Association —

March 11.—Capt. W. E. Brophy—"Production of Charcoal at Potrero Gas Plant for War Defense Service"; Robt. Eltringham—"Proposed Master Electrician's Law"; Non-listing Adding Machine Contest—Accuracy and Speed.

Los Angeles Jovian Electric League —

March 19.—Col. Samuel Rees—"War and Home Service of the Salvation Army."

March 26.—R. T. Burge—"What to Do with the Bolshevik"; Congressman H. Z. Osborne—"The Reconstruction Problem."

San Francisco Electrical Development League —

March 17.—Charles Victor, Pacific Coast manager Yawman & Erbe—"Personal Side of Scientific Salesmanship."

March 24.—J. D. Fenstermacher, sales manager Columbia Steel Company—"Making Steel Electrically," illustrated by moving pictures.

HAPPENINGS IN THE INDUSTRY

TRADE NOTES

San Joaquin Valley Notes —

The Bright Spot Electric Company has recently entered the field at Stockton. W. A. Murphy and G. A. Marengo are the proprietors.

Gould the Light Man at Stockton has just moved into a finely equipped new store in the shopping district in Stockton.

The Sullivan Electric Company of Modesto have recently opened for business in an attractively equipped store.

The Los Banos Electric Shop has recently been opened. R. G. Murphy is the proprietor.

The Star Electric Company at Bakersfield has recently moved from East Bakersfield into a very attractive location in Bakersfield proper.

The E. M. M. Service at Lindsay has under construction a new building which will give them one of the finest electrical establishments in the state. They expect to occupy it within thirty days.

Lawrence Scott, formerly with the Mt. Whitney Power Company, has recently bought a half interest in the Chaffee Electric Company at Visalia.

E. B. Anderson of Coalinga has just moved into a fine retail establishment, and is opening a fully equipped retailing business.

Henry Fenneman of the United Electric Company, at Taft, was a recent visitor to San Francisco.

The Central States Electric Company at Fresno have recently expanded their place of business, taking in the store next door, which will be devoted to the selling of washing machines and vacuum cleaners.

Incorporation —

The firm of Woods, Huddart & Gunn has been incorporated under the new name of Gunn, Carle & Co. The business will be conducted as heretofore, but on a broader scale. In addition to iron and steel products they are prepared to furnish electric furnaces, cranes, industrial trucks, plant equipment and supplies.

Western Representatives —

Bittman & Battee, Inc., manufacturers' agents, 84 Second street, San Francisco, have been appointed representatives of the Hazard Manufacturing Company of Wilkes Barre, Pa., manufacturers of steel and wire rope, electric wires and cables, etc.

Bond Issue —

The Railroad Commission of California, which exercises jurisdiction over capital issues in this state, has authorized the sale of a block of Western States Gas & Electric Company 5% bonds, due 1941. A number of Pacific Coast dealers, as well as Montgomery & Company of Philadelphia, are associated with the bond department of H. M. Byllesby & Company in selling the bonds at 89½ and interest to yield 5.80%.

A Catalog File —

The Purchasing Agents' Association of Northern California, with headquarters at San Francisco, is starting, for the benefit of its members, a general catalog file. The association through its secretary, Mr. D. B. Gray, 230 California street, San Francisco, invites manufacturers and dealers generally to send complete sets of their latest catalogs and trade publications to the above address. Catalogs covering particularly machinery, mechanical goods, hardware, iron and steel products, etc., are especially requested. This association has over one hundred members located in San Francisco, Oakland and other cities in Northern California, who represent an annual purchasing power of nearly $100,000,000.

University Extension Course —

The University of California Extension Division is offering "Business Law for Engineers," an evening lecture course, to begin Thursday, April 10, at the San Francisco Public Library. The series will include thirty lectures by Mr. Eugene G. McCann, a member of the California bar, who has had seven years' experience in engineering work in this state. Following are several of the topics to be discussed:

Evidence, Contracts, Torts, Equity, Real Property, Corporations, Agency, Sales, Negotiable Instruments, Railroads and Common Carriers, The Engineer's Legal Relations with Others, Contract Letting, Contract Forms.

The lectures will be given every Thursday evening in the lecture room of the library, which is located at the corner of Larkin and McAllister streets. There is no admission charge for the initial lecture at 8 p.m., April 10th.

CIVIL SERVICE EXAMINATIONS

U. S. Civil Service examinations for the positions of Junior Inspector of Radio Apparatus, Junior Inspector of Telephone Equipment, and Junior Inspector of Telegraph Equipment, are to be held on April 15th. Salaries range from $1200 to $1500 per year and the competition is based upon physical ability, education, training, experience and fitness.

PROPOSED LEGISLATION IN OREGON

BY GEO. L. MYERS

The Thirtieth Session of the Oregon legislature adjourned on February 27. No legislation of a detrimental nature to public utilities was enacted, and the session was constructive in its results. However, some legislation was proposed that would have been adverse to the industry had it succeeded in being enacted.

House Joint Resolution No. 19 was the most vicious measure proposed. It provided for the creation of hydroelectric districts throughout the state and made it possible to bond to the extent of two per cent of the assessed valuation of all property in the state; the districts could bond to the extent of five per cent and municipalities within the districts to a like percentage. Had the resolution passed and met the approval of the people and become a part of the constitution, existing investments in public utility properties would have been put in jeopardy with the prospect of unfair competition and capital prevented from making further investments in hydro-electric development. The resolution was finally withdrawn.

Senate bill No. 4 provided for an amendment to the public utility statute to make it impossible for the Public Service Commission to change or modify any rate previously fixed by contract between a municipality and a public service corporation prior to November 7, 1912, when the public utility act was approved by vote of the people. This would have impaired the power of the commission in fixing reasonable rates and would have been contrary to the theory and practice of modern regulation vesting full powers of control as to service and rates in state authorities. An interesting legal question became involved in consideration of this bill, and that was as to whether the commission possessed the power to lower rates fixed by franchise. It was conclusively shown by able argument in committee and on the floor of the Senate that the commission did possess this power, because the state never had by special legislative act divested itself of the sovereign power to regulate public utility rates up or down. Although the bill was favorably reported by a senate committee it failed to pass by a vote of 21 to 9.

Senate bill No. 288 amended the present statute regarding powers of ports to provide that they can develop power for their own purposes. As finally enacted it protects public utilities from competition, inasmuch as the ports are restricted to the development of power for the operation of port facilities only and cannot engage in the business on a commercial scale.

Several house bills were introduced, but failed of passage, with reference to taxation of public service corporations. These bills attempted to make the book value or value ascertained by the Public Service Commission the basis for purposes of taxation, rather than continue the prevailing method of capitalizing the earning power and making the commercial or going value the value for assessing taxes.

A proposed constitutional amendment to make the workmen's compensation act compulsory failed to pass. Several attempts were made to amend the workmen's compensation act by placing additional burdens upon the employer and subjecting him to greater possibilities of personal injury suits, but without success. The act has been amended, however, to make it possible on July 1, 1920, for the commission to regulate rate schedules for contributions to the fund, such rates to be based upon the hazard and experience involved in each industry. This is desirable and more fair rather than to continue the existing practice of schedules fixed by statute.

SAFETY FACTORS IN MULTIPLE ARCH DAMS

A Letter to the Editor

Editor Journal of Electricity,—

Dear Sir: In your issue of March 15, 1919, you published an article entitled "Recent Multiple Arch Dams" by John S. Eastwood, wherein he describes four multiple arch dams he recently completed in San Diego county. Of these the Lake Hodges dam and the San Dieguito dam are most interesting to me inasmuch as Mr. Eastwood appears to claim, on page 265, line 25 from below, that his designs—for the Lake Hodges dam, at least—were accepted in competition with two other types.

As I was one of the competitors, I wish in the interest of fair play to ask Mr. Eastwood to at least make a further statement making it plain, that the designs he sent to the contractors for competitive bidding were very different from the design the structures shown in the pictures were actually built from. Either a note to that effect, or else publish his drawing No. 3 and the elevation on drawing No. 1, which were the principal drawings sent to the contractors.

I am perfectly willing to admit that I lost in competing with that design, but I most emphatically object to being told in a technical journal, that the Lake Hodges dam, as built, was won in a competition. I believe the owners know too, now.

Fortunately, the State Engineering Department interfered and compelled a safe design.

As for my own design—should anybody be interested—it can be found published in the Proceedings of the Am. Soc. of Civil Eng. for May, 1918, page 613, where it is used as an illustration for a paper entitled "Arch Action in Arch Dams." This structure is a single arch 6 ft. thick at the crest and 33 ft. thick at the bottom (127 ft. water pressure), provided with two gravity tangents at the ends to be used as spillways for ordinary floods. For max. floods the arch was to act as a weir also.

Although very little information is given in the article, it is plainly noticeable that two features I objected to at the time of competition have been eliminated in the construction design, namely, the down stream overflow deck and a girder near the top of the dam onto which the arches butted in order to make an overflow weir (shown on dr. No. 3 if published).

The down stream overflow deck consisted of a slab 9 inches thick, 24 ft. center to center span reinforced with ½ in. sq. steel spaced 12 in. both ways.

A slab 9 in. thick with a span of 24 ft. will hardly support its own weight, besides there is not enough steel (½ in. sq. spaced 12 inches) to take care of the temperature stresses alone in a longitudinal direction, the canyon being about 500 ft. wide at the top, and no contraction joints provided. During max. flood this slab must stand the load due to a 12 ft. overflow on the crest. Towards the bottom the sheet of falling water becomes thinner, of course, but the load becomes intensely "live."

The girder near the top of the dam (drawing No. 3 if published) appears to be 15 in. thick and to be reinforced with two rows of ½ in. sq. steel spaced 12 in. centers. At an elevation about 6 ft. below the crest the arches intersect this vertical cross wall at the one-third points between supports, 24 ft. centers (buttresses). The water pressure this slab would have to stand during flood conditions, would be that due to a head of $6 + 12 = 18$ ft. or 1125 lbs. per sq. ft. Calling the load uniformly distributed, which is in favor of the slab, we find from tables that a strip of this girder 1 ft. wide will support about 120 lbs. per running ft. if reinforced more than four times as much as called for on the drawing. The steel specified will about take care of stresses due to temperature changes. Unfortunately for the girder, the load is 1125 lbs. per running ft., and not 120 lbs.

Mr. Eastwood claims, in the article, that the structures shown have a minimum factor of safety of 10 or are 1000 per cent strong, and states he employs a stress of 325 lbs. per sq. inch. The arch on one dam is stated to be 9 in. thick 30 ft. span holding a max. water-pressure of 12 ft. It takes an optimist to find the 1000 per cent strength on thin arches, even if stressed less than 325 lbs. per sq. inch.

On the San Dieguito dam design I competed against, the thickness of 9 inches was continued down to where the head was 16 ft., and in addition the span was 50 ft. My judgment was, that it required nearly twice that thickness with a span of only 40 ft. to obtain a factor of safety of between 4 and 5, which is all I attempted. This judgment lost that job for me, but I understand it corresponded pretty closely to the judgment exercised by the state authorities later.

Yours very truly,

L. JORGENSEN.

WESTERN CENTRAL STATION STATISTICS

Preliminary figures of the forthcoming quinquennial report of the central electric light and power stations of several of the western states have been given out by the Bureau of the Census, Department of Commerce.

The statistics relate to the years ending December 31, 1917, 1912, and 1907, and cover both commercial and municipal plants. They do not, however, cover electric plants operated by factories, hotels, etc., which generate current for their own consumption; those operated by the Federal Government and state institutions; and those that were idle.

CENTRAL STATIONS OF WASHINGTON

	1917	1912 (1)	1907	Per cent of increase (2) 1907-1917	1912-1917	1907-1912
Number of establishments	88	70	71	....	....	....
Commercial	74	60	65	....	....	....
Municipal	14	10	6	....	....	....
Income	$4,295,845	$3,087,721	$3,410,542	25.9	39.1	— 9.5
Electric service	$4,201,216	$2,976,297	$3,210,814	30.5	41.2	— 7.6
All other	$ 94,629	$ 111,424	$ 190,728	—50.4	—15.1	—41.6
Total expenses, including salaries and wages	$3,433,747	$2,270,132	$2,388,628	43.8	51.3	— 5.0
Number of persons employed	1,112	1,078	885	25.6	3.2	21.8
Salaries and wages	$1,093,365	$ 880,309	$ 800,441	36.6	24.2	10.0
Total horsepower	151,038	95,884	67,224	124.7	57.5	42.6
Steam engines:						
Number	46	55	64	....	....	....
Horsepower	36,270	18,128	11,016	229.2	100.1	64.6
Internal-combustion engines:						
Number	16	3	2	....	....	....
Horsepower	600	155	90	....	263.6	....
Water wheels:						
Number	70	54	48	....	....	....
Horsepower	114,168	77,591	56,118	103.4	47.1	38.3
Kilowatt capacity of dynamos	99,875	57,283	56,308	50.6	74.4	—13.6
Output of stations, kilowatt hours	242,370,956	71,414,473	257,785,236	— 6.0	239.4	—72.3
Stationary motors served:						
Number	5,678	2,279	1,933	193.7	149.1	17.9
Horsepower	64,694	28,148	29,686	117.9	129.8	— 5.2
Number of street lamps:						
Arc	1,047	2,661	(4)	....	—60.7	....
Incandescent, etc.	26,594	20,223	(4)	....	31.5	....

(1) Many of the companies operate both light and power stations and electric railways, and their systems of bookkeeping will not always permit the preparation of separate reports. For this reason a number of establishments reported as light and power stations in 1907 were treated as belonging to the electric railways in 1912, and some restored for 1917.

(2) A minus sign (—) denotes decrease. Percentages are omitted where the base is less than 100.

(3) Exclusive of $5,556,757 in 1917 and 4,422,080 in 1912.

(4) Not available.

Considerable increases are shown for the five-year period 1912-1917, but their significance is diminished by reason of the fact that certain establishments which did both light-and-power and railway business were reported as in the electric-railway industry in 1912 but have been treated as belonging to the light-and-power industry in 1917. The number of establishments increased from 70 in 1912 to 88 in 1917. The actual number of new establishments added since 1912 was 36, of which 32 were commercial and 4 municipal; but, as the result of a number of combinations in the commercial systems, and various other changes, a net increase of only 18 establishments, 14 of which are commercial, is shown by the figures. In 1917 the total income, 97.8 per cent of which was for electric service, amounted to $4,295,845, an increase of 39.1 per cent since 1912. The total expenses in 1917 were $3,433,747, an increase since 1912 of 51.3 per cent. The total horsepower in 1917 was 151,038, an increase of 57.5 per cent as compared with 1912. Water supplied the greater part of the horsepower at each of the three censuses—83.5 per cent in 1907, 80.9 per cent in 1912, and 75.6 per cent in 1917. The total dynamo capacity, 99.875 kilowatts in 1917, shows an increase of 74.4 per cent as compared with 1912. The output of current in 1917 was 242,370,956 kilowatt hours, representing an increase of 239.4 per cent over 1912. The number of arc street lamps decreased from 2,661 in 1912 to 1,047 in 1917, or 60.7 per cent, while the incandescent street lamps increased in number from 20,323 to 26,594, or 31.5 per cent.

CENTRAL STATIONS OF CALIFORNIA

	1917	1912	1907	Per cent of increase (1) 1907-1917	1912-1917	1907-1912
Number of establishments	98	112	129	—24.0	—12.5	—13.2
Commercial	79	97	115	—31.3	....	—15.7
Municipal	19	15	14	....	....	....
Income(2)	$40,277,613	$27,685,573	$14,416,529	179.4	45.5	92.0
Electric service	$38,768,970	$26,461,154	$13,922,028	178.5	46.5	90.1
All other	$ 1,508,643	$ 1,224,419	$ 494,501	205.1	23.2	147.6
Total expenses, including salaries and wages	$32,705,192	$22,803,526	$12,580,937	160.0	43.4	81.3
Number of persons employed	6,167	5,738	3,128	97.2	7.5	83.4
Salaries and wages	$ 7,132,056	$ 5,823,203	$ 3,094,193	130.5	22.5	88.2
Total horsepower	1,181,394	848,248	384,673	207.1	39.3	120.5
Steam engines:						
Number	122	169	201	—39.3	—27.8	—15.9
Horsepower	450,180	414,206	159,644	182.0	8.7	159.5
Internal-combustion engines:						
Number	11	11	11	....	....	....
Horsepower	2,237	1,980	16,585	—86.5	13.0	—88.1
Water wheels:						
Number	224	205	172	30.2	9.3	19.2
Horsepower	728,977	432,062	208,444	249.7	68.7	107.3
Kilowatt capacity of dynamos	816,974	588,281	238,480	242.6	38.9	146.7
Output of stations, kw-hrs.	2,746,567,337	1,747,459,041	661,606,309	315.1	57.2	164.1
Stationary motors served:						
Number	21,480	29,059	11,560	85.8	—26.1	151.4
Horsepower	1,410,271	603,742	200,067	604.9	133.6	201.8
Number of street lamps:						
Arc	13,738	19,341	(3)	....	—29.0	....
Incandescent, etc.	108,781	75,802	(3)	....	43.5	....

(1) A minus sign (—) denotes decrease; percentage omitted where base is less than 100.
(2) Exclusive of $107,617 in 1917 and $75,817 in 1912, reported by street and electric railway companies as income from sale of electric current.
(3) Not available.

Substantial increases are shown in practically all the important items for both five-year periods covered by the table, but as a rule the following increases from 1907 to 1912 were greater than those for the following five years. The number of stations decreased from 129 in 1907 to 112 in 1912, and to 98 in 1917. The actual number of new establishments added since 1912 was 16, of which 12 were commercial and 4 municipal; but, as the result of combinations in the commercial systems, and various other changes, there was a net decrease of 14 establishments, resulting from a decrease of 18 in the commercial and an increase of 4 in the municipal establishments. In 1917 the total income, 96.3 per cent of which was for electric service, amounted to $40,277,613, the percentages of increase being 45.5 and 92 for the two periods 1912-17 and 1907-12, respectively. The total expenses in 1917 were $32,705,192, the percentages of increase for the later and earlier five-year periods being 43.4 and 81.2 respectively. The total horsepower in 1917 was 1,181,394, an increase of 39.3 per cent as compared with 1912, and during the preceding five years the rate of increase was 120.5 per cent. Water supplied the greater part of the horsepower at each of the three censuses for which figures are given, 61.7 per cent of the total in 1917, compared with 50.9 in 1912 and 54.2 in 1907. The total dynamo capacity, 816,974 kilowatts in 1917, shows an increase of 38.9 per cent as compared with 1912, the rate of increase during the preceding five-year period being 146.7 per cent. The output of current generated in 1917 was 2,746,567,337 kilowatt hours, representing an increase of 57.2 per cent over 1912, as against 164.1 per cent for the period 1907-12.

CENTRAL STATIONS OF MONTANA

	1917	1912(1)	1907	Per cent of increase (1) 1907-1917	1912-1917	1907-1912
Number of establishments	60	29	33	....	....	....
Commercial	54	27	31	....	....	....
Municipal	6	2	2	....	....	....
Income(2)	$9,695,196	$3,883,410	$2,469,131	292.7	149.7	57.3
Electric service	$7,947,011	$3,292,385	$2,376,472	234.4	141.4	38.5
All other	$1,748,185	$ 591,025	$ 92,659	1786.7	195.8	537.8
Total expenses, including salaries and wages	$5,474,003	$2,411,668	$1,469,808	272.4	127.0	64.1
Number of persons employed	732	514	319	129.5	42.4	61.1
Salaries and wages	$ 969,498	$ 625,918	$ 360,768	168.7	54.9	73.5
Total horsepower	345,004	115,710	68,817	401.3	198.2	68.1
Steam engines:						
Number	39	38	31	....	....	....
Horsepower	8,684	12,750	11,830	—26.6	—31.9	7.8
Internal-combustion engines:						
Number	39	1	....	....	....	....
Horsepower	1,403	75	....	....	....	....
Water wheels:						
Number	82	64	62	....	....	....
Horsepower	334,917	102,885	56,987	487.7	225.5	80.5
Kilowatt capacity of dynamos	182,079	74,398	39,602	359.8	144.7	87.9
Output of stations, kilowatt hours	965,453,777	379,212,617	137,379,261	602.8	154.6	176.0
Stationary motors served(3):						
Number	7,374	1,962	971	659.4	275.8	102.1
Horsepower	305,241	75,184	33,240	821.3	307.3	126.2
Number of street lamps:						
Arc	1,966	1,560	(4)	....	26.0	....
Incandescent, etc.	10,664	2,791	(4)	....	282.1	....

(1) A minus sign (—) denotes decrease; percentage omitted where base is less than 100.
(2) Exclusive of $319,671 in 1917 and $242,305 in 1912, reported by street and electric railway companies as income from sale of electric current.
(3) The number of motors for which the total hp. is given was not fully reported.
(4) Not available.

Decided increases are shown for most of the important features embraced in the statistics of the electric light and power systems of Montana. These increases, as a rule, are more pronounced for the later five-year period, 1912 to 1917. During this period the total number of establishments increased from 29 to 60, a net gain of 31, 27 of which were commercial and 4 municipal. The total income, which was $2,469,131 in 1907, increased to $3,883,410 in 1912 and to $9,695,196 in 1917, the rates of increase being 57.3 per cent for the earlier and 149.7 per cent for the later five-year period. Although most of the income at each census was from electric service, there was an increase in all other income from $591,025 in 1912 to $1,748,185 in 1917, or 195.8 per cent. The total expenses, which were $2,411,668 in 1912, amounted to $5,474,003 in 1917, an increase of 127 per cent. The total horsepower increased from 115,710 in 1912 to 345,004 in 1917, or at the rate of 198.2 per cent. The horsepower derived from water wheels, which represented the great bulk of the total, increased during the same period from 102,885 to 334,917, or at the rate of 225.5 per cent. The capacity of the generators increased from 39,602 kilowatts in 1907 to 74,398 in 1912 and to 182,079 in 1917, or at the rates of 87.9 per cent and 144.7 per cent, respectively, for the earlier and later five-year periods. The output of stations shows a very rapid growth, from 137,379,261 kilowatt hours in 1907 to 379,212,617 in 1912 and to 965,453,777 in 1917, the rates of increase being 176 per cent and 154.6 per cent for the earlier and later five-year periods, respectively.

LATEST IN EVERYTHING ELECTRICAL

(A plug which fits all electric heating appliances, a device for starting small induction motors from a distance, additions to the line of marine supplies in which the various manufacturers have been specializing and a hospital call switch which meets the special needs of that service are here reviewed. An interesting monorail system which promises to meet the needs of mining companies and lumber firms away from the railroad has been installed in the Northwest. —The Editor.)

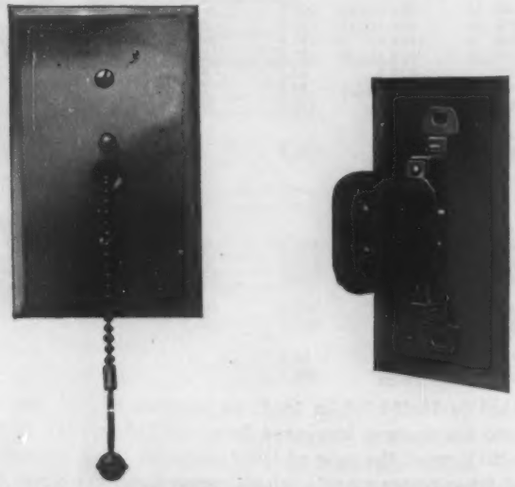
BRYANT CANDELABRA CLEAT RECEPTACLES

The Bryant cendelabra cleat receptacle identified by catalogue number 612, is made with the regular spun copper screw shell and also with a shell, of spring wire, which expands when the lamp base is threaded into it. The tension of this spring wire is more than sufficient to eliminate the possibility of the lamp becoming loosened from contact when subjected to great vibration and jar. The base of the block is molded composition of especially high grade and of the character that is approved by the United States navy, amply strong to stand the most severe service. This is a particularly desirable receptacle for use where it is necessary to illuminate instruments such as are used on board vessels, in the cabs of railroad locomotives, etc. These devices are National Electric Code approved.

326 612

THE HOSPITAL CALL SWITCH

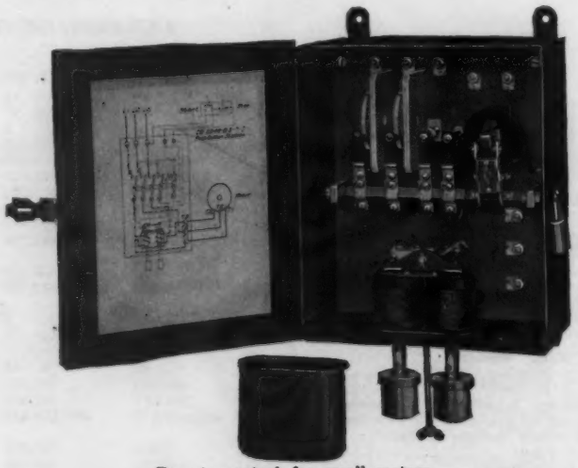
Very elaborate hospital call systems have been devised and installed, and in many instances are giving fairly satisfactory service, but one trouble often arises from their use because a great majority of them employ some form of standard wiring device which the patient uses to signal the nurse. The trouble experienced is due to the fact that the so-called standard wiring devices are not intended for such service. When used for this purpose they often break or fall apart and the result is that the patient may unfortunately come in contact with the flexible conductor carrying the voltage of the lighting circuit. Further, the flexible conductors carrying the push-button or pendent switch become soiled, worn or damp, thus making the signal inoperative. A new device called a "Hospital Call Switch" has just been developed by the engineers of the Cutler-Hammer Company of Milwaukee. It is made for installation in a standard switch outlet box and the wiring does not extend beyond the box. No flexible conductors or push-button switches are required for its use, consequently the annoyance of having these parts broken and soiled is eliminated. Further, as the live parts terminate in the wall, there is no possibility of the patient coming in contact with them. Therefore, it has none of the objectionable features spoken of above and besides, offers a means of making a much neater and cheaper installation. From the accompanying illustrations it will be seen that the new device consists of a C-H standard push and pull mechanism slightly modified. The switch is operated by a pull chain. A linen cord placed within easy reach of the patient is used to pull the switch "on,"—the cord being attached to a short piece of chain which extends through a horn in the plate and is attached to a projection through the plate and is used by the nurse to push the switch off. The plate is the same size as those used for wall switches and receptacles and the switches and the plates are made singly or in gangs. The new device may be used on any standard lighting circuit of 125 volts or less.



Front and rear of switch. The patient uses linen cord for pulling the switch on and the nurse the button above it for pushing the switch off on this new Hospital Call Switch.

REMOTE CONTROL STARTERS

There has always been a demand for a device for starting small induction motors from remote points by throwing them directly across the line.



Remote control for small motors

The General Electric Company has recently developed and placed upon the market such a starter, known as the CR-7006 Remote Control Switch, arranged for push button control. This starter is applicable for use with motors up to and including 5 hp., 110 volts, and 7½ hp., 220, 440 and 550 volts. In addition to its starting function it provides protection against under voltage and overload.

The device consists of a 25 ampere, 3 pole, contactor with two inverse time limit gravity reset overload relays mounted on a slate base totally enclosed in a strong sheet iron case.

A small "start and stop" push button station is used as a remote control switch. Completion of the starting circuit, by pressing the "start" button, energizes the coil of the magnetically operated switch, closing the contacts, which

throw the motor directly on the line. Interruption of the circuit, or a radical decrease in voltage, permits the contacts to reopen by gravity, thus stopping the motor, which can not start again until the "start" button is pressed.

The overload relays can be adjusted for various values, ranging from normal up to 50% above normal. They can also be adjusted over a wide range of time values. The relay trips automatically and resets by gravity.

The cover of the enclosing case is furnished with a hasp so that if desired it can be locked in a closed position by padlock.

COMMUTATOR RESURFACER USED TO RENEW COLLECTOR RINGS

For many years it was taken for granted that when the commutator started to spit and spark and showed evidence that it was in need of being dressed up, the only thing to do was to shut down that equipment, remove the commutator and turn it down in a lathe, or temporarily tide over the trouble by using sand paper. A Chicago man decided, however, that there must be a short cut somewhere and set out to find it.

In determining the qualifications of the simplest and easiest way of doing this, he figured that the work should be done, first, while the motor was in service, and secondly, by some inexpensive medium. Experiment finally brought forth a non-conducting composition which, when molded and hardened, presented a continuous abrasive surface that by simple contact with the commutator while in motion, would cut down the mica, ridges and bars. This was put on the market under the name, the Ideal Commutator Resurfacer.

The problem was solved as far as commutators were concerned. For awhile a.c. equipment was not considered, but it was soon found that the same appliance that does the work on the d.c. commutators can be used on the a.c. collector rings, providing it is the right size. The resurfacer is manufactured by the Ideal Commutator Dresser Company of Chicago.

A PLUG FOR ALL CONNECTIONS

Every manufacturer of electric heating appliances is making the terminals different, so that if a woman is using a table stove from Hotpoint and has a flat iron from the General Electric Company and maybe a toaster from the Redtop Company, she has three different cords with three different attachment plugs.

A new patented plug has been gotten out by the Redtop Electric Company which fits on every electrical heating appliance. This means table stoves, room heaters, toasters, flat irons, and so forth.

A specially devised clip maintains perfect contact on either flat or round terminals. Being formed of two pieces it offers a flat surface to make contact with a flat terminal and a round surface to make contact with a round terminal. One of the pieces is made of spring brass and so formed as to preserve its resiliency, insuring a continued perfect contact after long use.

The machine screws, holding the two halves of the case together, screw into threaded bushings which are moulded into the case. Loose nuts are eliminated.

The case is made of black heat proof composition, knurled on the sides and highly polished. No spring is needed for the cord, the openings for the cord being made with rounded edges which cannot fray the cord.

NEW MONORAIL SYSTEM

What is said to be the first successful monorail system in the United States is now in operation in the Highland-Surprise Mine, on Pine Creek, in Coeur d'Alene district, according to the Pacific Builder and Engineer. The event has caused much interest among operators of the vicinity and several go so far as to say that the system will completely solve the transportation problems that have been so vexatious in the past.

The track as now operated is over a 10 per cent grade leading down the creek from above the mill. Equipped with a 20-horsepower Ford engine and loaded with three tons, the car is said to attain a speed of 18 miles an hour on the up grade. The most important feature of the system is the cheapness of construction, grading being entirely dispensed with and unevenness in contour overcome by the height of the posts supporting the track. The cost of upkeep is therefore practically negligible, while 1000 feet of track can easily be built in a day under ordinary conditions. Grades of from 10 to 15 per cent can be negotiated without difficulty and the inventor claims that the cost of construction over average Coeur d'Alene mountain routes will run at about $3000 per mile.

Either gasoline or electric power can be used and it is said that one man can attend to haulage of from 100 to 300 tons a day over a distance of several miles at a very low cost. Another feature that will carry strong appeal to mine owners is that the track may be economically constructed in winter. Only two sizes of timbers are used and posts can be made of such length as to place the track above all possibilities of snow troubles. The load is carried on both sides of the car and below the rail. Three or four trailers each carrying 3 tons can be connected with the car. For transportation of ore special side-dumping pockets are provided.

The inventor is W. H. Shepard, who has resided in Seattle for eighteen years and who has devoted the past seven years to perfection of the system. Some time ago he brought his invention to the attention of President W. W. Papesh of the Highland-Surprise Mining Company, who provided the capital to place the project on a business footing and install the short track now in operation. The first trials were so satisfactory that Highland-Surprise has concluded to extend the line to Masonia, the settlement three miles below the mine and on the line of the branch road of the O. W. R. & N. Co. now being constructed up Pine Creek.

While monorail cars are now in successful use in many parts of Europe, no serious attempt has previously been made to apply the system to ore-handling in mountain regions and it seems reasonable to look for a complete revolution in transportation methods at points where conditions are similar to those that have caused so much trouble to Highland-Surprise management. It is worthy of note that a monorail system had been in use at Brussels for ten years, preceding the war, while another, in operation in Ireland, is said to attain a speed of 80 miles an hour.

From the foregoing it would seem that Mr. Shepard has produced something of undoubted economic and practical value for the kind of transportation that has heretofore been so costly and difficult. He claims that he can build this line for $3000 a mile. Transportation is a problem that is occupying the best thought of the country because future progress is so dependent upon it, and to the industrial world this monorail system will mean the opening of new projects and the revival of many that have long lain dormant whose products were sorely needed to meet the demands of the nation as well as private industry.

BOOKS AND BULLETINS

A new 64-page, 8½ in. by 10 in. catalog entitled "C-H Wiring Devices—Push Button Specialties," is being distributed by The Cutler-Hammer Manufacturing Company of Milwaukee. The appearance and contents indicate that much time and care were taken in the preparation of this book and that practically all the wiring devices and push button specialties made by this company are illustrated, described and listed. The contractor-dealer and large user of conduit fittings will find the center spread extremely useful. It is devoted to a complete table which lists the conduit fittings made by eleven different manufacturers, and gives the form and catalogue number of the various fittings that may be readily used for mounting C-H receptacles and sockets. The book is well indexed and bound in striking orange buff colored cover. It is intended for distribution to jobbers, dealers, contractors, central stations, architects and others interested.

Manganese and Chromium in California

A report entitled "Manganese and Chromium in California," known as Bulletin No. 76, is now being distributed by the State Mining Bureau. California has long been known to contain deposits of commercial ores of both chromium and manganese; but only a limited production was made for many years, owing to the high cost of placing these materials on the principal markets in the eastern states. The data, of course, had particular war significance, but the volume is still of value in that it is the only publication of recent date containing comprehensive and detailed data on the manganese and chromium resources of the entire state of California. Considerable information is given regarding concentration of these ores, particularly of chromite. The volume is well illustrated with photographs and maps.

Are Prices Going Down?

The U. S. Department of Labor has published a monograph by Professor Irving Fisher of the Department of Political Economy, Yale University, on the subject of prices in the period ahead of us. Professor Fisher confirms the conviction that has been growing in the minds of many men throughout the country, that the high price level to which we have attained is no temporary thing but permanent. We are simply using more counters than before in effecting exchanges. To everyone engaged in trade, finance or industry, Professor Fisher's message has especial importance. In general, prices, and hence wages, are not going to fall. In the case of particular products, there may be particular reasons why prices may drop, but in the absence of definite knowledge of such special reasons it is safe to assume that prices are not going to drop. In other words, you can go ahead with the assurance that even if it costs you more now to produce, you will be able to sell your product at a higher price. There is a new price level all around.

Westinghouse New Annual Catalogue

The Westinghouse Electric & Manufacturing Company of East Pittsburgh, Pa., has issued a complete catalogue in which all of their electrical supplies are listed. The catalogue is made up of 1264 pages of description pertaining to the products of the company and a score of other pages contain a complete cross index, and index to style numbers, and a table of "Approximate Cost Multipliers," which enables one to figure the approximate cost of all supplies listed. The book contains also miscellaneous information of a technical and engineering nature. Practical suggestions for the use of many kinds of apparatus for the transmission and utilization of electric power are given.

A REVIEW OF INTEREST

It will be interesting to readers of the Journal of Electricity to follow some of the comments that have been made in the literature of the world concerning the series of articles on fuel oil and steam engineering that have appeared in the columns of the Journal of Electricity from time to time for the past two years under the authorship of Robert Sibley and Charles H. Delany. It will be recalled that these articles were published in book form last June under the title "Elements of Fuel Oil and Steam Engineering." Since that time the book has been reviewed by many noted authorities. The splendid tributes paid to this work have from time to time been published in the columns of the Journal of Electricity. One of the most recent and most comprehensive reviews is that which appeared in the Journal of the American Society of Mechanical Engineers signed by B. R. T. Collins.

Book Review by A. S. M. E.

Elements of Fuel Oil and Steam Engineering: A Practical Treatise Dealing with Fuel Oil, for the Central Station Man, the Power Plant Operator, the Mechanical Engineer and the Student. By Robert Sibley, B. S., and Charles H. Delany, B. S., M. M. E., Members Am. Soc. M. E. Technical Publishing Company, San Francisco, 1918. First Edition. Cloth, 6 x 9 in., xiv + 320 pp., 127 illustrations, charts and figures. $3 net.

This book has as its underlying theme a study of fuel-oil power-plant operation and the use of evaporative tests in increasing the efficiency of oil-fired plants. The subject-matter has been treated in three main subdivisions: First, an exposition of the elementary laws of steam engineering; second, the processes involved in the utilization of fuel oil in the modern power plant; and third, the testing of boilers when oil-fired.

A new method has been used in treating the first subdivision, in that the viewpoint taken is that of the oil-fired instead of the coal-fired power-plant operator. This subdivision naturally requires the largest portion of the work.

The five chapters on Furnaces, Burner Classification, Gravity, Moisture Content, and Heating Value of Oils contain the gist of the information which will be of value to the inexperienced engineer whether he views the subject from a consulting or operating standpoint. The engineer who has had considerable experience in this line will be interested in the chapters on Suggestions for Fuel-Oil Tests and Their Tabulation, and the Use of Evaporative Tests in Increasing Efficiency of Oil-Fired Boilers, as these chapters, especially the latter, contain definite information worked out from practical experience in regard to furnace arrangement, oil burners, draft, flue-gas analysis and regulation.

The most interesting part to the experienced fuel-oil engineer is Appendix 2, which contains the report of conclusions in full of the committee appointed by the Governor of California, in the latter part of 1917, to investigate the fuel-oil situation in that state and report their conclusions and recommendations. These conclusions cover utilization, production, consumption, storage, conservation and the remedy for the present shortage of oil in California. This is a remarkable report which should be read by every engineer interested in the future of fuel oil in this country.

We believe the authors have succeeded admirably in accomplishing the purposes which the book attempts to cover. It is unquestionably the best work of its kind for students of steam engineering who are interested in fuel oil. It is also of value to engineers, both consulting and operating, as it gives a large amount of information hitherto not covered by any work of this kind, and at the same time brings together much important matter which has appeared at various times in various forms. The subject-matter is clearly developed, and illustrated examples are worked out in great detail. The book is also profusely illustrated. To sum up, we believe this work occupies a field hitherto vacant in this particular branch of engineering.

B. R. T. COLLINS.

NEW ELECTRICAL DEVELOPMENTS

(A generally quiet period is reported from the Northwest, while in the Pacific Central District plans for new power projects are still coming forward. Several rate decisions of interest have been made by the railroad commission. In the Southwest, the Southern California Edison Company starts active work on its new construction, and in the Intermountain District a tendency toward the establishment of municipal plants by small communities is to be noted. —The Editor.)

THE PACIFIC NORTHWEST

SEATTLE, WASH.—Only two bids were received by the city for the purchase of $245,000 municipal light and power plant and system bonds.

SEATTLE, WASH.—The city council has appropriated $20,000 for repairs to the Cedar river power plant pipe line and $15,000 for light department construction work.

COLFAX, WASH.—The city council is considering the installation of a municipal electric light plant to furnish electricity for street lighting and pumping water to the reservoir.

LEBANON, ORE.—The Lebanon Light & Water Company has purchased a site on which it proposes to erect a new power plant. The old plant will be used for a pumping station.

PINEVILLE, ORE.—The Ochoco Irrigation District has closed a contract employing the Puget Sound Bridge and Dredging Company, Central Building, Seattle, Wash., to build a large hydraulic earth-fill dam.

YAKIMA, WASH.—A power development of about 10,000 h.p. in the Wapato project is included in the plans of the United States Indian Service. Power from this source will be available only during the irrigation season.

VANCOUVER, B. C.—The Pacific Electric Welder & Manufacturing Company, 1018 First avenue, Seattle, Wash., contemplates the construction of a factory on Industrial Island, to cost, including machinery, between $60,000 and $70,000.

MARSHFIELD, ORE.—Reconstruction of the dutch ovens under the boilers of the power plant at the Smith mill, at a cost of $2500, has been decided upon by the Mountain States Power Company, according to Manager A. L. Martin.

SEATTLE, WASH.—Express service for the outside districts night and morning is one of the improvements contemplated by Thomas F. Murphine, superintendent of the utilities department, Seattle, when the city takes over the street railway system of the Puget Sound Traction Light & Power Company.

KLAMATH FALLS, ORE. — The California-Oregon Power Company of this place has decided to proceed with the construction of a dam across the head of Link river near here in accordance with the terms of a contract with the government for use of the power house at Copco, California.

TACOMA, WASH.—That the municipal street railway is not earning enough money to pay interest on outstanding bond issues is the statement of City Comptroller John Roberts of Tacoma to the city council. The comptroller urged the council to find some method of meeting unpaid bills.

PORTLAND, ORE.—The entire property of the Home Telephone and Telegraph Company, appraised at $2,100,000, was sold at public auction at the courthouse and bid in for $500,000 by the Security Savings and Trust Company, in accordance with previous arrangements with the bondholders.

SELAH, WASH.—The Pacific Power & Light Company has just closed a contract for the construction of a 6600 volt, single-phase distribution line running east from this place to serve nine ranches. The company is also building a 6600-volt, three-phase line to serve Terrace Heights pumping station No. 2, southwest of the Yakima Country Club house.

ASTORIA, ORE.—Plans are being prepared by the Pacific Power & Light Company for the erection of a 4500-h.p. electric generating plant adjoining its present plant on Astor street. Additional power is required to supply service to the proposed new 3000-barrel flour mill of the Astor Flouring Mill Company and for the extension of the Astoria Marine Iron Works.

PORTLAND, ORE.—Construction of a tunnel through Council Crest connecting Portland with the rich Tualatin valley by a direct route is proposed by Commissioner Perkins as a city reconstruction project. Previous efforts in behalf of the Tualatin valley tunnel brought estimates of $1,500,000 and it is probable that with the increased cost of labor and material the project now would cost approximately $2,000,000.

NORTH BEND, ORE.—The Mountain States Power Company, it is reported, is arranging for the removal of its power plant from Marshfield to North Bend. Until recently the plant has been operated in conjunction with the lumber mill of the C. A. Smith Lumber Company. The closing down of the mill has necessitated the removal of the plant or the installation of boilers and equipment. When the plant is removed new machinery will be installed.

SEATTLE, WASH.—Supt. of Utilities Thomas F. Murphine of Seattle has recommended to the city utilities committee of the city council that the city discontinue the sale of six car tickets for 25 cents. In connection with the recommendation for the discontinuance of tickets, Mr. Murphine said that the influenza and the loss by the use of tickets had caused the present municipal lines to run behind $3,657 in the last three months. Another recommendation was for the elimination of the automobile parking privileges on First, Second and Third avenues.

THE PACIFIC CENTRAL DISTRICT

PORTERVILLE, CAL.—The city council has under consideration a municipal power plant.

COALINGA, CAL.—The net income of the Coalinga Gas and Power Company in 1918 is reported as $3,462.

RED BLUFF, CAL.—The Bend Irrigation Company is to install considerable concrete pipe to perfect its distributing system.

HONOLULU, T. H.—The Hawaiian Electric Company is planning to increase its capital to $5,000,000, big improvements being contemplated.

SOUTH SAN FRANCISCO, CAL.—A temporary steel tower is being erected at the Federal wireless station to replace the one destroyed by fire.

BAKERSFIELD, CAL.—The supervisors have granted to the Valley Natural Gas Company permission to lay a pipe under the southern boundary of section 10.

KERN COUNTY, CAL.—Reporting for the year 1918 the Kern Mutual Telephone Company shows a net income of $13,622, but deductions therefrom amount to $45,841.

SAN FRANCISCO, CAL.—Lemuel J. Miller, manager of the Postal Telegraph Cable Company, announced that the Pacific cable, connecting with Manila, China, Japan, and the Dutch East Indies, was restored after interruption since February 17th.

BIG PINE, CAL.—Joseph Mears and Mary Dunlop Mears, of Big Pine, have applied for 25 inches of the water of Birch Creek, Inyo County, for power purposes. Permit has been granted for 25/40ths cubic foot per second.

BAKERSFIELD, CAL.—The Southern California Edison Company will purchase $9,000,000 worth of material in Kern county for its new development projects, according to H. C. Katze of the Chamber of Commerce.

REDDING, CAL.—Contracts for the construction of the Hoover tunnel and the Messelbeck dam of the Happy Valley irrigation project have been awarded to N. A. Kramer of San Francisco. The contract price for the work was $315,000.

NEVADA CITY, CAL.—The big snow storm in the mountains caused the Deer Creek, Alta and Drum power plants of the Pacific Gas and Electric Company to shut down temporarily owing to snow blocking the ditches supplying the power houses with water.

MARYSVILLE, CAL.—The proposed formation of the Yuba Irrigation District is to be protested before the Board of Supervisors when the petition for forming the district comes up for a hearing. The protest is to come from Hallwood Irrigation District people.

FRESNO, CAL.—The California Peach Growers, Inc., Fresno, have applied for 4 cubic feet per second of Middle Fork, Tuolumne river, Tuolumne county, tributary Tuolumne river, for power purposes. The water is to be used for operation of a saw mill and camp purposes.

VISALIA, CAL.—The Central California Electric Company, with plants in Lindsay, Visalia and Tulare, has received its incorporation charter and at a meeting held recently elected directors as follows: H. J. Verfurth, Geo. Delano, Wm. Tarbel, J. W. Faux, and C. Bartholomew. The company is incorporated for $75,000.

LIVE OAK, CAL.—The Sutter Basin Improvement Company is putting in a $65,000 electric pumping plant and has applied to the State Water Commission for a permit to appropriate 42 cubic feet of water per second from the Sacramento river. The main canal is one mile long, and the water will irrigate 3240 acres.

SAN FRANCISCO, CAL.—California Natural Gas & Development Company has been incorporated here to manufacture, generate and distribute gas and electricity. The capital stock is $1,000,000, with 1,000,000 shares at $1 each. Subscribers are: Chas. H. Ham, Stanley L. King, Charles Williams, Albin Youngholm and P. C. Black.

VISALIA, CAL.—Surveys will be started in the near future in Tulare county by the United States Department of Agriculture to determine the amount of flood waters wasted in the rivers of each year. The figures will form the basis of plans for a system of storage through which this water may be conserved throughout the irrigation system.

BIG BAR, CAL.—Frank B. Hoffman of Big Bar has made application for 2 cubic feet per second of Rowdy Creek, Trinity county, tributary of Trinity river, for supplying power to operate a saw mill. The diversion works consist of a dam and ditch and flue 900 ft. long. Power will be developed by means of a water wheel—fall 125 ft.

SAN FRANCISCO, CAL.—The State Railroad Commission has issued a supplemental order authorizing the Sierra & San Francisco Power Company to reduce its charges for power served to large industrial consumers. The order substitutes for a recently authorized surcharge of three mills a kilowatt hour a graduated scale to become effective March 25.

BRANDY CITY, CAL.—Pember S. Castleman, Brandy City, has applied for 400 cubic feet per second of the North Fork of Feather river, Yuba county, tributary of Feather river, for power purposes. The diversion works consist of a concrete arch dam 145 ft. high, 400 ft. long on top and 50 ft. long on bottom, and a pipe line 1 mile long. Estimated cost of works, $85,000.

FRESNO, CAL.—Four of the ten districts affected by the Pine Flat project are now organizing and Fresno district recently held a meeting to vote on the same subject, according to a report of the Kings River Conservation District executive committee, which has drawn up a resolution asking state assistance in measuring the waters of Kings river.

MERCED, CAL.—Plans are being prepared by Allison & Allison, architects, 1405 Hibernian Building, Los Angeles, for a group of buildings for the Merced Union High School district, consisting of academic, administration and assembly building, domestic science, manual training and commerce building, power house and gymnasium. About $130,000 is available for the project.

TURLOCK, CAL.—W. D. Wagner, secretary of the Merced War Fund Association, has been appointed campaign manager by the Merced Irrigation District Campaign Committee, and commences at once his work of heading the campaign for the formation of a district of approximately 175,000 acres to be irrigated by storage water to be provided by the district system.

CORCORAN, CAL.—A project is in process of formation to be known as the Corcoran Irrigation District, and within a short time plans will have progressed far enough for the presentation of a petition to the board of supervisors and the other necessary legal steps taken for its final organization. The territory will include 50,000 acres of land of which the city of Corcoran will be about the center.

YREKA, CAL.—A group of agriculturists of Montague and Yreka have made application for 10 cubic feet per second of Shasta River, Siskiyou county, tributary to Klamath river, for agricultural purposes. The water will be diverted from Klamath river by an electric pump and conveyed through a pipe line about 592 feet long to the head of the main ditch, which will be five miles in length. Cost, $5,000.

PLACERVILLE, CAL.—Purchase by the growers of a portion of the system of the Western States Gas & Electric Company here and the formation of a company which will distribute water sufficient for the irrigation of approximately 12,000 acres of land are the features of the compromise which is to be effected in the case of the El Dorado County Water Users' Association against the Western States Gas & Electric Company.

OROVILLE, CAL.—The Great Western Power Company of California engineers and surveyors have established a camp two miles east of Belden in the Feather river canyon to start surveys for the $6,000,000 hydroelectric plant, construction of which will begin in Butt valley this year. The first construction work is to be the building of a railroad up Butt creek to the site of the power plant, so material and machinery may be unloaded at the site.

SACRAMENTO, CAL.—An exploration party of the State Engineering Department will begin the task of examining and selecting sites for seven reservoirs along streams tributary to Sacramento river for the storage of flood waters to be used for irrigation and for hydro-electric power development under State supervision, as announced by W. F. McClure, State Engineer. Proposed sites along the Bear, Feather, American and Yuba rivers and other streams between Sacramento and Redding will be examined.

SAN FRANCISCO, CAL.—The Pacific Gas and Electric Company in an effort to adjust its rate schedules for metered commercial, agricultural and general power has applied to the State Railroad Commission for authority to substitute schedules that have been found to be more in accordance with the demands for service in the various cities. The substitution of rates will, according to the company's petition, decrease the charges for electric energy to many consumers and increase the bills of a few. In the event of an increase under the readjustment the company asks permission to continue the old rates to avoid any additional charge.

SAN FRANCISCO, CAL.—Indications are that two bondholders' committees of United Railroads of San Francisco have come to an agreement relative to an amended plan for reorganization of the company and that some announcement will be forthcoming shortly. The committees had under consideration an amended plan which provided for the taking up at par of $5,200,000 underlying bonds of United Railroads. To take care of the $23,500,000 general mortgage first sinking fund gold 4s, it was proposed to substitute preferred stock or income bonds or both.

MONTEREY, CAL.—Authority to increase its present rates for electric energy by surcharges that will mean an average raise of 20 per cent has been granted the Coast Valleys Gas and Electric Company by the Railroad Commission, but the order also carried with it instructions to the company to improve its service. The company's contemplated improvements call for the expenditure of $25,000 in new capital and consist of the overhauling of the steam plant at Monterey, line and transformer improvements at Monterey, the rebuilding of the Salinas substation and installation of modern switching apparatus, installation of feeder voltage regulators at Monterey and Salinas and increased substation attendance.

FRESNO, CAL.—Horace M. Woolley, of San Francisco, has applied for 600 cubic feet per second of the water of Kings river, Fresno county, tributary to San Joaquin river, for the development of electric power. The diversion dam is to be 50 ft. high, 200 ft. long on top and 180 ft. long on the bottom, gravity type, concrete overflow dam. Canal 10½ miles long. Water will be developed by means of impulse water wheels direct connected to electric generators. The total amount of power developed, 65000 Th. hp. Total fall utilized, 1000 feet. The water is to be returned to Kings river after use. Estimated cost of proposed works, five to six million dollars.

THE PACIFIC SOUTHWEST

LOS ANGELES, CAL.—The Superior Light & Heat Company of this city has applied for dissolution.

EL CENTRO, CAL.—Arrangements have been completed by the Holton Power Company for remodeling its plant at Sixth and Main streets.

SAN PEDRO, CAL.—A new passenger station will be constructed by the Pacific Electric Railway at San Pedro, to be erected on the site of the old Southern Pacific freight station.

POMONA, CAL.—The Pomona Valley Telephone and Telegraph Company has reported to the Railroad Commission for the year ended December 31, 1918, showing a gross operating revenue of $75,974.

LORDSBURG, N. M.—The purchase of a 1000 h.p. boiler, a 1000 h.p. steam turbine and steam equipment is reported under consideration by the Eighty Five Mining Company.

SANTA BARBARA, CAL.—The Santa Barbara Gas Company has sold out to the Southern Counties Company. Large extensions are expected, and natural gas will be piped from the Santa Maria oil fields.

EL SEGUNDA, CAL.—Pipes will be laid from Redondo along El Camino Real and the Redondo Boulevard to Ballona avenue, for gas connection to El Segunda. The Southern California Gas Company is doing the work.

SANTA BARBARA, CAL.—The Big Dam at Gibraltar Rock on the Santa Ynez is almost completed. When it is finished a lake six miles long will be formed capable of supplying a large city. It is expected that electric power will be developed later.

LOS ANGELES, CAL.—Application has been made to the city council for a franchise granting the right to construct and for a period of not less than 21 years, to operate an additional electric street and interurban railroad track south of and adjacent to the present San Pedro-Wilmington-Long Beach railroad.

LOS ANGELES, CAL.—In furtherance of plans for the extension of its service into Central and Northern California, the Southern Counties Gas Company of California applied to the State Railroad Commission for permission to purchase the gas properties of the Santa Barbara Gas and Electric Company and the Southern California Edison Company for $825,000 cash.

LOS ANGELES, CAL.—Pasadena is considering the construction of a municipal electric railway to Los Angeles, and has been offered an elevated railroad on a suspended car system. It is claimed that the trip between the cities on such a railroad could be made in eight minutes. The estimated cost is $1,000,000, about one-third that asked for a municipal line.

LOS ANGELES, CAL.—Having completed its new finances by the sale of $16,000,000 of bonds and debentures, the Southern California Edison Company has announced the starting of active work on a hydroelectric construction program that will mean the eventual expenditure of $125,000,000. It will take $20,000,000 to carry out the plans for the next three years, and their completion, it is stated, will mean the development of 150,000 horsepower in new hydroelectric plants for the industrial and agricultural requirements of the ten counties, with their 233 cities and towns, in which the company provides the electric supply to a rapidly growing population.

THE INTER-MOUNTAIN DISTRICT

WHITEFISH, MONT.—The city council has appointed a committee to make investigations as to the feasibility of establishing a municipal electric light plant in Whitefish.

PAROWAN, UTAH.—Application has been filed with George F. McGonagle, state engineer, by John L. Lowden of Parowan for permission to use 10 second-feet of water to be taken from Pargonah Creek in Iron County. The power is to be utilized to generate electricity.

SALESVILLE, MONT.—A project is under way for the installation of a hydroelectric power plant on Big Bear Creek, five miles south of here, to furnish electricity for lamps and motors in Salesvalle and the farmers in this district.

BURLEY, IDA.—The installation of four new automatic circuit breakers in the pumping units at the second lift station of the Minidoka project has been completed. The overhauling of the pumping stations is in progress.

PHOENIX, ARIZ.—The machinery on the power plants of the Salt River project has been overhauled. At the Chandler power plant, all old equipment has been removed and work started on excavation and tearing down the old walls preparatory to erecting a building and draft tube.

YERINGTON, NEV.—A petition asking the Lyon County Commissioners to authorize the creation of an irrigation district, comprising 130,000 acres of land, has been signed by 75 per cent of the landowners of the Smith, Mason and Lower Antelope valleys. It is planned to ask for the reclamation of the district.

CROOK, COL.—An election will soon be held to vote on the proposal to issue $20,000 in bonds for the installation of an electric light plant and water works systems in Crook. Plans are being prepared by the Henningson Engineering Company, National Bank Building, Omaha, Neb.

CARSON CITY, NEV.—To discuss the advisability of further bonding the city of Carson to acquire municipal power and water plants, a large gathering of people met at the Greater Carson Club. The report brought in by the committee appointed to consider the feasibility of the scheme was adopted and a resolution passed requesting Ormsby county's representatives in the legislature to introduce a bill authorizing the issuance of bonds.

THE VACUUM CLEANER —— THE VACUUM CLEANER

BESIDES YOUR REGULAR STOCK there are always some items of special value of which you keep small quantities on hand to meet occasional needs. The following items recovered by the vacuum cleaner from yesterday's occurrences are here presented as specialties deserving of special feature. They have not the bulk of the regular stock which is to be seen upon our shelves and in consequence are in constant danger of the dust heap. It is to rescue such items from this oblivion that this page has been instituted and turned over to our special electrical janitor.—The Editor.

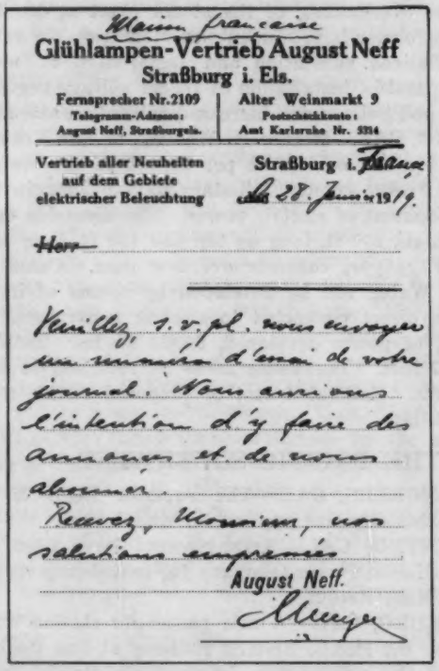
Fashion Shows sometimes reveal most astonishingly tastes in clothes—but surely none more surprising than the Fashion Show Luncheon of the Journal of Electricity which was recently tendered the staff by the business department of the organization. Here are the place cards—you can recognize some of your friends at least—but the luncheon unfortunately can not be reproduced. Several of the guests came in

costume with special electrical significance, one alleged clergyman who gyrated on his axis, for instance, representing a "rotary converter." This is but one of a series of such pleasant occasions in the Journal rooms with the various departments of the staff acting in turn as hosts.

Community Singing has been a pleasant feature of the San Francisco Electrical Development League's luncheon meetings. All the members can sing "K-Katy" by this time—and even "Smiles." Occasionally they try variations such as this one which was contributed by the efficient song leader, Lowell Redfield. Apparently he was inspired by the Sparks column of the Journal of Electricity:

There are sparks that get you snappy,
There are sparks that scare you blue.
There are sparks that fill your hearts with madness,
There are sparks that burn your fingers through.
There are sparks that have a double meaning,
That will bring you anguish and fatigue:
But the sparks that fill our hearts with gladness
Are developed at Electric League. —L. R.

Strassburg, France, is not waiting for the peace treaty to reunite itself to the allied territory. This interesting inquiry for information concerning the Journal of Electricity comes from a firm who, as can be seen, has already written France over the former "Elsass" of the postcard:



Maison française

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Vertrieb aller Neuheiten auf dem Gebiete elektrischer Beleuchtung

Straßburg i. Elsaß, den 28. Januar 1919.

~~Herr~~

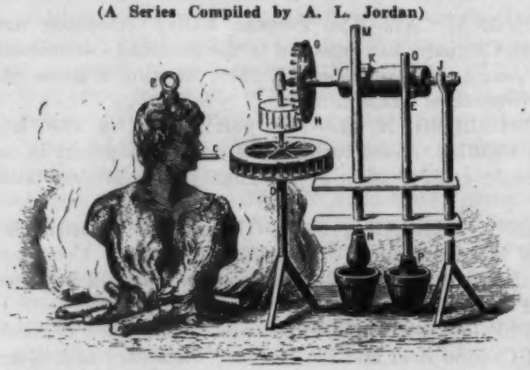
Veuillez s. v. pl. nous envoyer un numéro d'essai de votre journal. Nous aurions l'intention d'y faire des annonces et de nous abonner.

Recevez, Monsieur, nos salutations empressées

August Neff.

ENGINEERS OF YESTERDAY—6. BRANCA

(A Series Compiled by A. L. Jordan)



Who made the first suggestion for the impulse type of steam engine?

Giovanni Branca, who lived in Loretto, Italy, planned an impact steam machine in 1629 with which he proposed to drive other machinery for pounding corn, as shown in the picture. This suggestion came to reality in the hands of De Laval, in Sweden, two hundred and fifty years later. The next link in that chain of development was furnished by Parsons, in England, and a succeeding one by Curtis, in America.

THE VACUUM CLEANER —— THE VACUUM CLEANER